# INDUSTRY & WELDING

OCTOBER 1956

## Cost Cutting Ideas for Production and Maintenance Welding

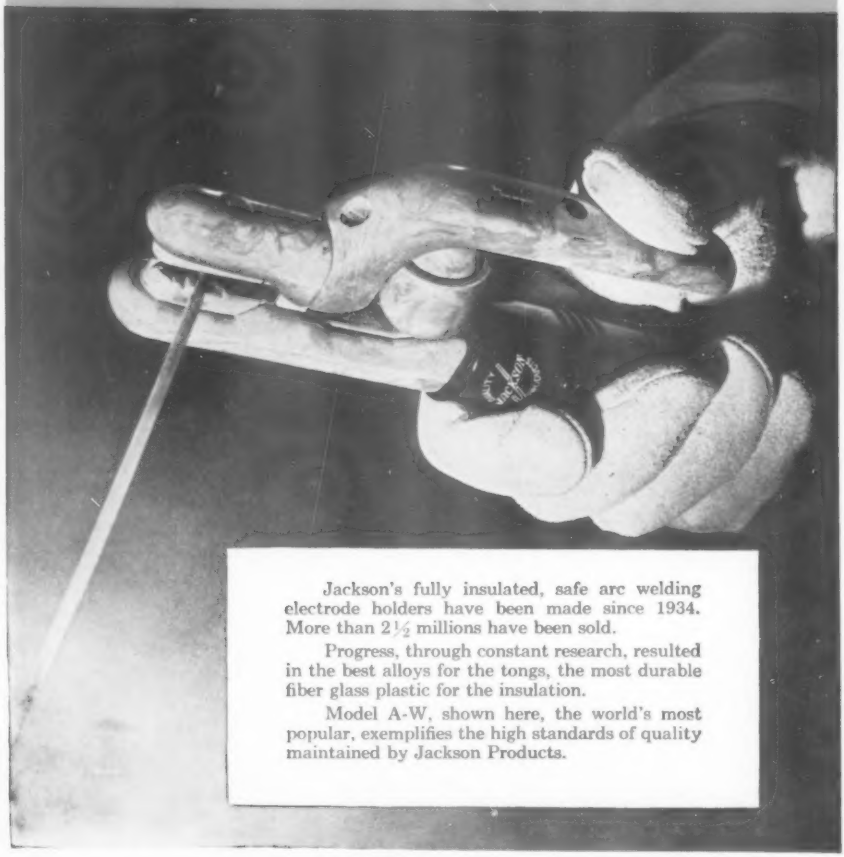
. . . PAGE 57

FRANCHISE CIRCULATION

## METAL SHOW ISSUE

**More than 40,000 welding users are reading this issue for *"here's how"* and *"where-to-buy"* help with their welding problems.**

# Quality Wins Out



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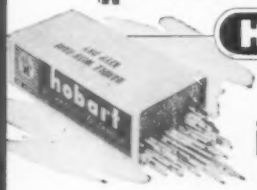


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# Industry & Welding

OCTOBER, 1956

VOL. 29 No. 10

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BPA

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## New instrument measures iron content in weld

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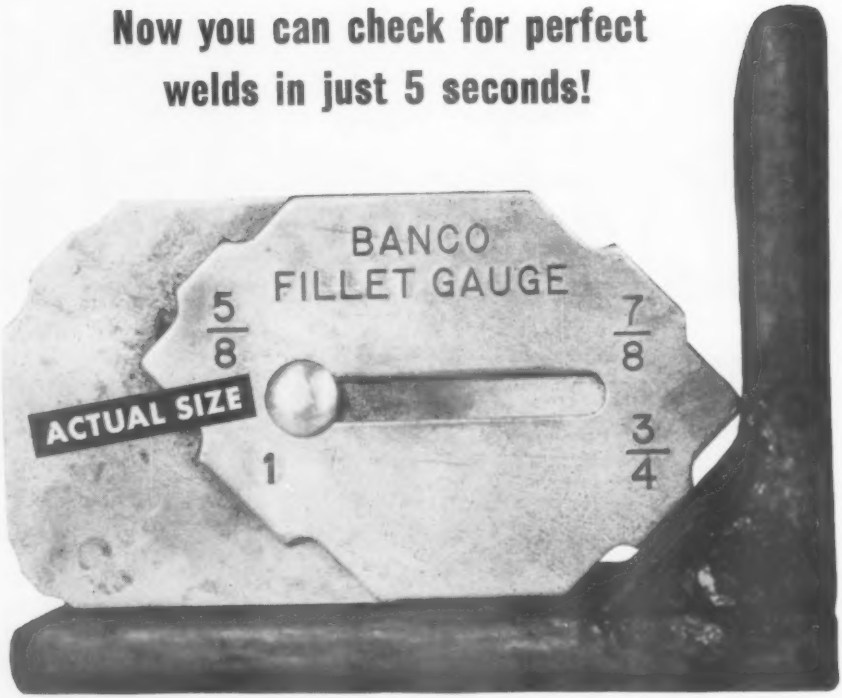


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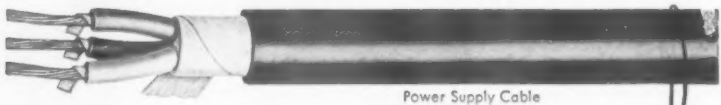

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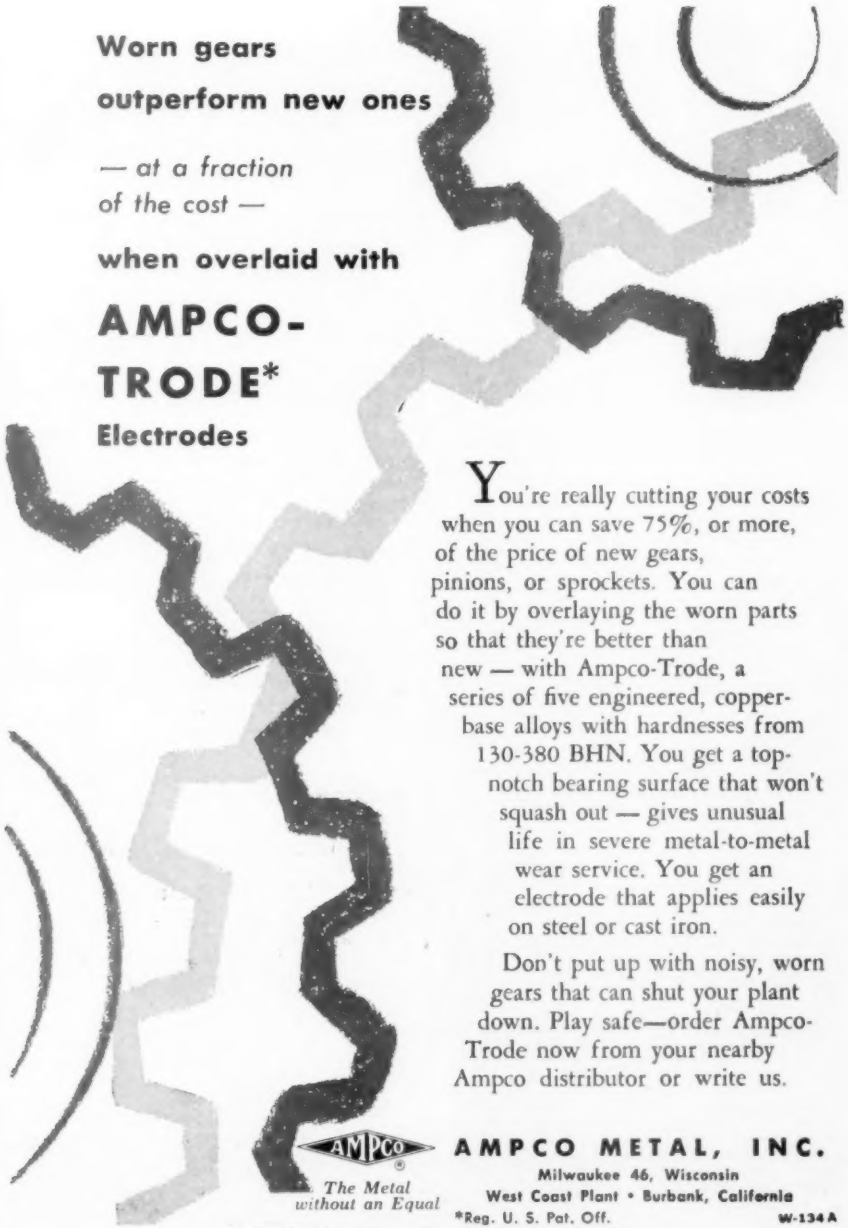

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# LETTERS TO THE EDITOR

## Ceramic Fixtures

Gentlemen:

I enjoyed very much your article in the March issue of INDUSTRY & WELDING entitled "Ceramic Fixtures are Key to Brazing by Automation."

Will you please forward further information regarding this fixturing method.

Please inform me of my nearest source of supply for ceramic fixtures.

William A. Kapke, Process Engineer (Welding), United Aircraft Products

*There have been repeated requests about ceramic fixtures as a result of this article.*

## Positioners

Gentlemen:

Would you please send us technical literature you may have covering Welding Positioning Machines? We would like to be familiar with the practice of using this equipment in connection with our many welding operations.

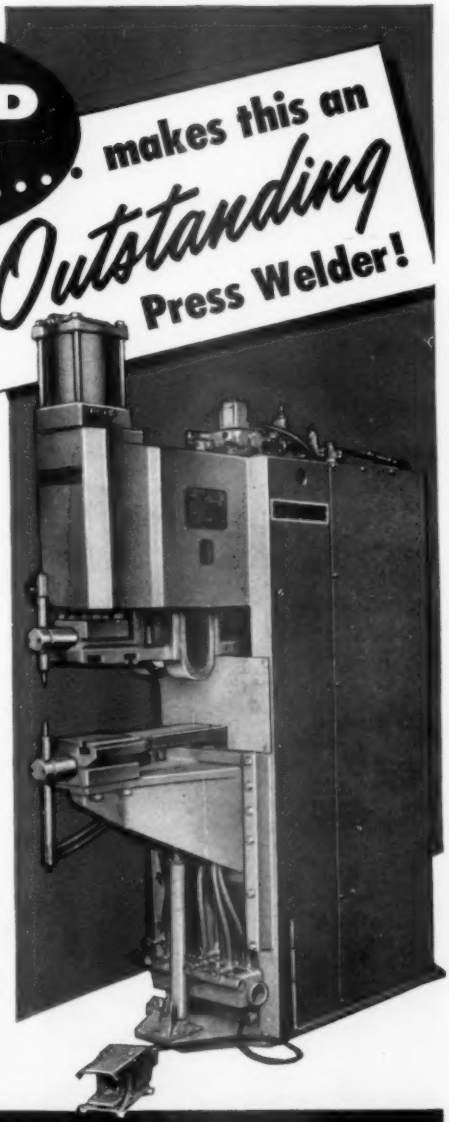
M. W. Meyer, President
General Blower Company

*We have referred Mr. Meyer to the "Positioneering" series currently running in INDUSTRY & WELDING. It is very complete.*

*(Turn to Page 12)*

# ADVANCED DESIGN....

## makes this an *Outstanding* Press Welder!



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## LETTERS TO THE EDITOR . . .

*(Continued from Page 10)*

### Ceramic Fixtures Again

Dear Mr. Gilbert:

We are extremely interested in obtaining detailed information, prices, and sources of supply on Ceramic Fixtures for Brazing. This process is described in March INDUSTRY & WELDING.

We will appreciate your usual prompt attention to this matter.

Frank Murphy, Sales Manager
Beaver Welding Supply Co.

*This information has been sent.*

### Adjustable "C" Clamps

Gentlemen:

We have been requested by our Hudson, New York Plant to secure any information you may have available on adjustable "C" clamps for use in our welding shops.

Please forward the information requested to the personal attention of the undersigned.

J. Hefferman, Director Purchasing Division, Universal Atlas Cement Company.

*We are continually reminded that welding is used in all industries.*

### New Tube Welding Process

Gentlemen:

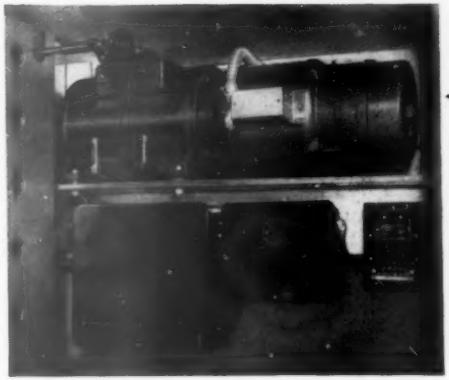
I missed your article on the new tube welding process developed by the Trent Tube Company, but did see reference to it in the March issue under Letters to the Editor.

I am interested in the details of the process and would greatly ap-

*(Turn to Page 14)*

## MAGNETIC BRAKE on TABLE ROTATION

**Is STANDARD EQUIPMENT at no extra charge when you Buy ARONSON Precision Gear Driven POSITIONERS.**



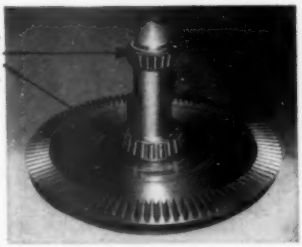
MAGNETIC BRAKE Built-In, gives smooth, exact stops for Table Rotation. No jockeying, forward and reverse, to get your weldment in Exactly the position you want. No danger to work and worker from overcoasting.

| TEST FOR ACCURACY OF STOPS, 6000 LB. POSITIONERS Degrees Table Rotation After Pushing STOP Button: | | | |
|---|---|---|---|
| At 1 RPM Table Speed | Full Load | 1/2 Load | No Load |
| WITH Magnetic Braking | 2.6° | 2.8° | 3.0° |
| Without Magnetic Braking | 12.7° | 13.4° | 15.2° |

If any positioner **without** Magnetic Braking stops quicker than this test shows, that is a sign of too few Anti-Friction Bearings and not enough precision in its gearing. In short, that there is too much drag and too much wear — a short life.

ARONSON MACHINES are 100% equipped with Ball Bearings or Timken Taper Roller Bearings — No Plain Bushings to wear out or require frequent servicing and periodic replacement.

All Gears Used in ARONSON Positioners are Precision Gears with High Strength — Low Friction.



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## LETTERS TO THE EDITOR . . .

*(Continued from Page 12)*

preciate any information that is available.

John F. Rudy, Assoc. Metallurgist, Armour Research Foundation

*Mr. Rudy is typical of many readers who find valuable information in the pages of INDUSTRY & WELDING.*

### Shucks, T'wer'nt Nothing

Gentlemen:

We wish to thank you for the publicity given our products and free literature in several recent issues of your magazine. The number of requests we have received for further information and for samples has been gratifying.

(Miss) Verley Archer
Tempil® Corporation

*Thanks Miss Archer, we're rather proud of our record for drawing inquiries for our advertisers.*

### Welding Process Information

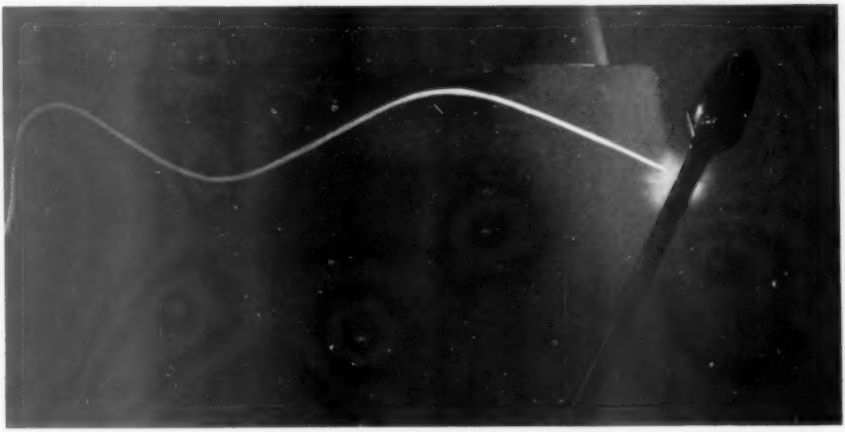
In your February issue of INDUSTRY & WELDING, there were two articles which I enjoyed very much and I am wondering if it would be possible to obtain extra copies.

The first article is "How to Speed Production with $CO^2$ Welding." The second is "How Specialization Pays Off in Tool and Die Welding," by Charles Berka, Associate Editor.

Frank S. Smith
Roy Smith Company

*Extra copies have been sent.*

# New Reflective Marking is 100 times brighter than soapstone



● Proved under actual conditions in steel fabrication plants, the BRITE-LINE* Reflective Marking Kit provides an amazing new method for steel layout work. The brilliant line applied by the BRITE-LINE applicator (shown above) assures complete accuracy, regardless of shop lighting conditions . . . puts an end to error . . . time loss . . . eye strain.

BRITE-LINE goes on easily over rust, corrosion, scale or oil film; it is not affected by normal torch heat and will not rub off easily — yet is quickly removed by steel wool or wire brush. Line width is uniform and permanent . . . unaffected by rain or exposure for long periods of time.

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Brite-Line

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## Considerably lower cost

— is only one reason for the wide and growing swing to EASY-FLO brazed designs. Other decisive reasons are . . . the great strength and indestructibility of EASY-FLO brazed assemblies . . . the wider latitude in design this construction permits.

## Here's a typical example

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Parts are assembled with two U-shaped pieces of EASY-FLO wire preplaced as shown above (arrows) then fluxed and placed on turntable machine.

Prepared assemblies are carried through a bank of city-gas-air burners and drop into a detergent bath. The set-up with one operator can turn out better than 275 handles an hour.

**EVERY INDUSTRIAL DESIGNER SHOULD KNOW** why EASY-FLO brazed construction is so strong, versatile and economical. Bulletin 20 gives full details. Write for a copy today.

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Moore Dry Dock says:

## "Fitting up is 50% faster, with our BUX Magnetic Plate Clamp"

"With our Bux portable magnetic plate clamp, we completely eliminate wedges, dogs and other time-wasting steps in fitting up. We just position and hold plates with our Bux and tack weld! Another big saving is less clean up time after the welding job is done. There's no deburring or cutting off clips. And with us this means bigger savings in costly fit up time". These are the words of Mr. Fawke, Hull Superintendent at Moore Dry Dock Company, Oakland, California. And his money-saving experience is just like that of every shop that's using profit-making Bux magnetic products. Why not ask your dealer for details.

BUX

**BUCK MFG. CO.**
100 Roberts Rd., Los Gatos, California

2953

**Circle No. 66 on Reader Service Card.**

They've Caught on with
the Men Who Wear Them
—and the Men Who Buy Them!

Specially Tanned

# AO "Drednaut" COWHIDE GLOVES

SC5X163 SC5X143

Protects on gas welding and heaviest amperage electric welding. One-piece back and palm. Welted where necessary.

Gunn cut one-piece back reduces number of seams to minimum. Lined on back of hand from wrist to finger tips.

Also ask about our SCTX100,SCTX200 and SC3013 Gloves — sure to please every preference.

**Welders** who wear them like the comfort of AO Drednauts — even after long exposure to heat, they help reduce hand fatigue because they're soft and flexible.

**Safety Directors** who buy them like the way the leather resists abrasion for longer life. Lab and field tests show that this leather outlasts all others on wear, with practically no shrinkage on exposure up to 350° for 90 minutes.

Your nearest AO Safety Products Representative can supply you.

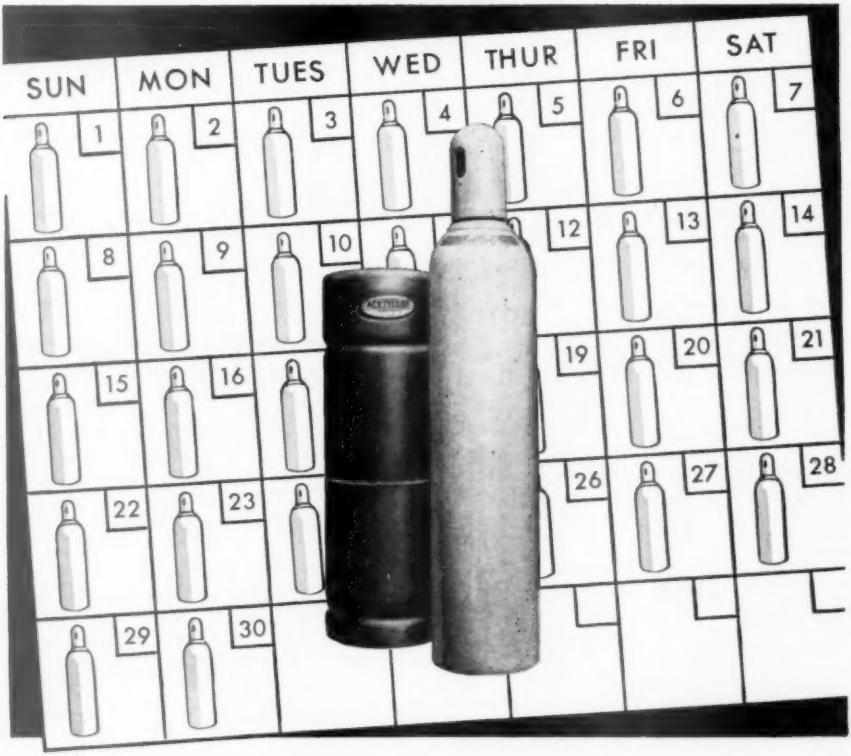
**Quick Facts**

- As *flexible* as horsehide
- As *strong* as horsehide (tensile strength)
- As *heat resistant* as horsehide
- More abrasion-resistant than horsehide

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

**Circle No. 56 on Reader Service Card.**




# IF YOUR CYLINDERS LAST LONGER THAN 30 DAYS

. . . Chances are you can cut demurrage costs under your LINDE Distributor's Cylinder Lease Plan. Leasing LINDE Oxygen and PREST-O-LITE Acetylene Cylinders can save you up to $10 per cylinder per year, depending upon your welding needs.

Choose from two sizes each of oxygen and acetylene cylinders: oxygen capacities are 80 cu. ft. and 150 cu. ft.; acetylene capacities are 60 cu. ft. and 133 cu. ft. Linde Air Products Company maintains your lease cylinders against normal wear and tear, and retests them periodically at no cost to you. Prompt delivery service assures you a steady supply of full cylinders in even exchange for your empties.

## See Your "LINDE" DISTRIBUTOR Today

Or, write: LINDE AIR PRODUCTS COMPANY, A Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, New York. *In Canada:* Linde Air Products Company, Division of Union Carbide Canada Limited, Toronto.

The terms "Linde" and "Prest-O-Lite" are registered trade-marks of Union Carbide and Carbon Corporation

**Circle No. 110 on Reader Service Card.**

# NEWS of the WELDING INDUSTRY

## Whitehead Metals Appoints J. T. Stewart

Appointment of John T. Stewart and Charles H. Swan to newly created positions of Welding Product Manager and Assistant Welding Product Manager has been announced by C. D. Grover, president of Whitehead Metal Products Co., Inc.

STEWART

In his 31st year with Whitehead, Mr. Stewart specialized for the last 11 years in the sales and technical area of welding products and acted as manager of the Welding Department.

## G. E. X-Ray Creates 2 Marketing Sections

The X-Ray Department of General Electric Co., Milwaukee, Wisc., has created two separate marketing sections in place of a single section. It was announced by John H. Smith, general manager, that the Medical X-Ray Section will be headed by Gordon E. Williams, while the Industrial X-Ray Section will be under the direction of Edward W. Philleo.

## Matasovic Returns from Russian Tour

One of a group of 18 selected persons who made a 30-day tour of Russian industrial and agricultural developments, John Matasovic, Universal Welding Supply Co., has returned to this country with interesting color slides of his trip.

While in Russia, Matasovic visited auto-truck industrial plants in Moscow, packing houses, collective farms, state farms and other points of interest. The group met with government officials in Kiev, Odessa, Yalta and Kharkov.

Universal Welding Supply and its manufacturing division, Oxo Welding Equipment Co., has moved to a new location at Cedar and Oak Streets, New Lenox, Illinois.

## Industry Mourns Passing of Harry C. Boardman

The welding industry mourns the recent passing of Harry Clow Boardman, director of research, Chicago Bridge & Iron Co., Chicago, Illinois.

Well known in the welding industry, Mr. Boardman was Past President (1939) of the American Welding Society and was Past Chairman (1950) of the Welding Research Council.

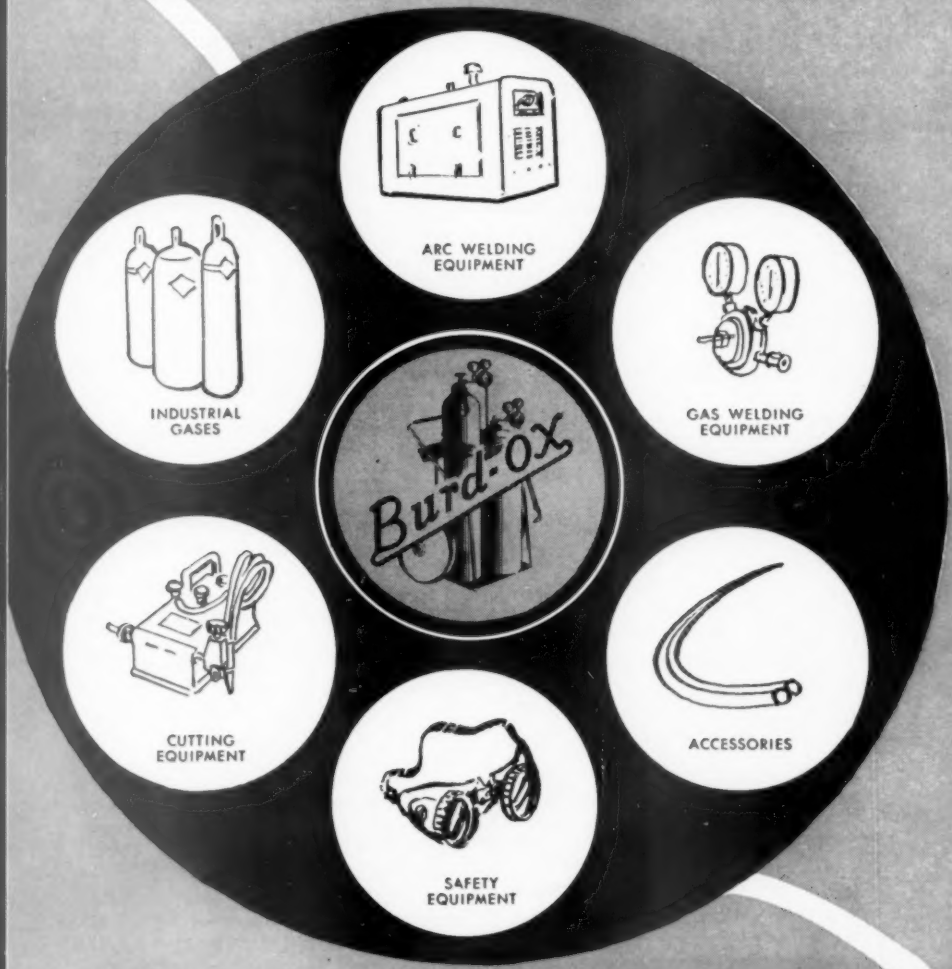
*(More News on Page 22)*



Circle No. 67 on Reader Service Card. →

# one CALL to BURDOX

## supplies ALL your needs for welding, cutting and safety equipment




When you make BURDOX your one source for all your welding and cutting equipment and supplies you save time . . . labor . . . money! Since we handle products for all welding and cutting methods we not only recommend the best and most economical for your purpose, but supply your needs completely! You'll find by checking with BURDOX first, you'll do your welding or cutting jobs better . . . faster . . . at lower cost! Catalog on request.

**THE BURDETT OXYGEN CO.**

3333 Lakeside Ave. • Cleveland 14, Ohio

PLANTS: Cleveland, Dayton, Findlay, Mansfield, Youngstown, Ohio and Los Angeles, California.

BRANCHES: Akron, Cincinnati, Columbus, Ohio.

## Carborundum Appoints Advertising Managers

In line with company policy of decentralization, recent major changes in the Marketing Division of Carborundum Company have resulted in establishment of Advertising Departments in Bonded Abrasives and Coated Abrasives Divisions of the Company. J. William Wade has been named Product Advertising Manager, Bonded Division, by T. H. Booth, division vice president. Joseph A. Mark was named Product Advertising Manager of the Coated Division, according to W. H. Wendel, vice president of that division.

**Coming Events**

OCT. 8-12: National Fall Technical Meeting, American Welding Society, Cleveland.

OCT. 8-12: Thirty-eighth National Metal Exposition and Congress, Cleveland Public Auditorium, Cleveland.

OCT. 22-26 National Safety Congress and Exposition, Chicago.

OCT. 29-30: West Central Zone Meeting, National Welding Supply Association, Hotel Nicollet, Minneapolis.

NOV. 1-2: Western Zone Meeting, National Welding Supply Association St. Francis Hotel, San Francisco.

DEC. 3-4: Southeastern Zone Meeting, National Welding Supply Association, Dinkler-Tutwiler Hotel, Birmingham, Ala.

DEC. 6-7: Southwestern Zone Meeting, National Welding Supply Association, Statler-Hilton Hotel, Dallas.

## Welsh Appoints Dennis

Appointment of Carlton E. (Charlie) Dennis to handle Midwestern sales for Welsh Manufacturing Co., Providence, R.I., was made recently. Prior to joining Welsh, Mr. Dennis was Sales Manager for Sellstrom Mfg. Co. He is widely known in the industrial safety field, having been associated with welding and safety equipment during his entire 20 year business career.

## Increased Use of Radioactive Isotopes

The number of industrial users of radioactive isotopes has increased more than 500 percent within the past five years, according to a survey made by Atomic Industrial Forum. More than 1000 industrial organizations in the United States are now using atomic energy by-products materials in 1347 different installations.

Of these, some 350 firms are using nuclear by-product materials in radiation inspection of welds and castings and other metal working operations.

Estimates indicate that radioisotope applications now mean an annual savings to industry of $200 million per year. This figure will reach the one billion dollar per year mark within the next 10 years.

*(More News on Page 164)*

## *NEW IMPROVED HARD FACING*

# Tough, hard ceramic coatings provide superior bearing surfaces

**Sprayed alumina forms "sapphire-hard" surfaces highly resistant to wear, abrasion and corrosion. Ideal for bearing surfaces, seals.**

Development of the new METCO THERMOSPRAY GUN for spraying high-melting-point ceramic materials at low cost opens up a variety of new practical applications. One that has produced a great deal of interest is the use of sprayed alumina coatings for bearing surfaces and mechanical seals. This THERMOSPRAY 101 Ceramic Powder produces surfaces with a hardness of 9.0 on the Moh scale, (only the diamond rates 10.0) with excellent resistance to wear, abrasion and corrosion. When used in combination with special phenolic or furane plastic sealers it provides superior protection against many acids.

Another THERMOSPRAY Powder – 201 – is zirconia which is somewhat softer than No. 101 but provides superior heat-insulating properties. Melting point of this material is 4600° F. and particle hardness 8.0 on the Moh scale.

Hard-facing alloys of the self-fluxing, nickel-boron-silicon type in powder form can also be applied with the METCO Type P THERMOSPRAY GUN. These coatings may be fused, semi-fused, or left unfused depending on the hardness desired, from RC 30 to RC 65, depending on the alloy and the process used.

The new THERMOSPRAY GUN operates without compressed air, only oxygen and acetylene being required. The free-flowing THERMOSPRAY powders are fed to the flame nozzle from a hopper atop the gun, melted and propelled to the surface to be coated. These materials are sprayed many times faster (up to 15 sq. ft. per hour—.010" thick) than has been possible with equipment previously available. Deposit efficiencies are in excess of 95%. These factors result in extremely low coating costs.

Preliminary engineering data contained in Bulletin 127 covers ceramic coatings while Bulletin 126 covers the hard-facing alloys. Either or both may be obtained by filling out the coupon below or writing on your company's letterhead. No obligation, of course.

*The following trade names are the property of Metallizing Engineering Co., Inc.* METCO*, THERMOSPRAY. **Reg. U.S. Pat. Off.*

*Pump rod sprayed with alumina provides superior protection against abrasion and corrosion*

METCO®

*Metallizing Engineering Co., Inc.*

1125 Prospect Ave.
Westbury, L. I., New York

Please send me ☐ free Bulletin 127 (ceramic coatings)
☐ free Bulletin 126 (hard-facing).

Name _____

Title _____ Company _____

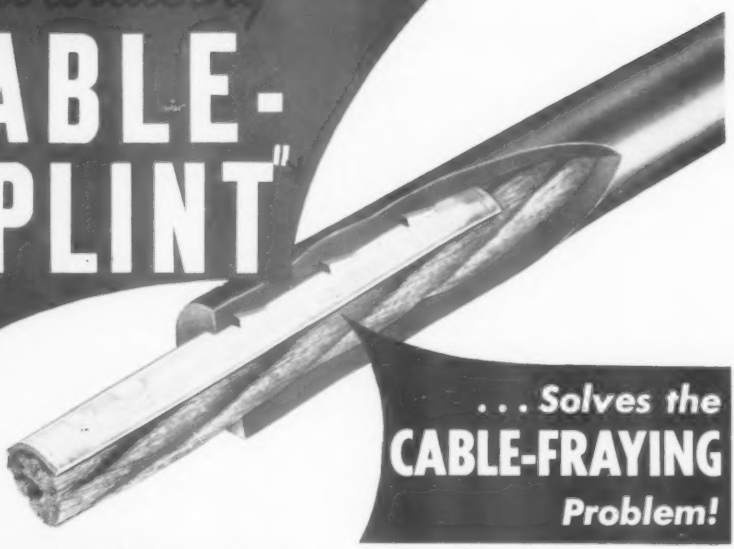
Address _____

City _____ Zone _____ State _____

**Circle No. 118 on Reader Service Card.**

*Introducing*

# "CABLE-SPLINT"



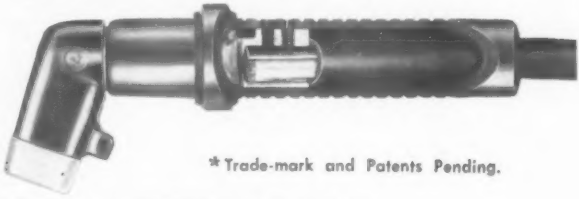
**. . . Solves the CABLE-FRAYING *Problem!***

The fraying of welding cable at the area where the cable connects to electrode holders has existed since the day arc-welding first began, and has wasted more man hours, more welding cable, and has necessitated more maintainance, than any other known factor.

"CABLE-SPLINT" completely, efficiently, and inexpensively solves the fraying problem by supporting the cable where it is stripped of its natural supporting jacket.

Driven down between the core wires and the jacket of the cable by light hammer blows the "CABLE-SPLINT" becomes a third member of the cable.

By this new method it is the natural resilience of the cable jacket which tightly binds the supporting "CABLE-SPLINT" to the core wires and solidly anchors it to the jacket.



*Trade-mark and Patents Pending.

"CABLE-SPLINT" is another exclusive feature of the "SHORTSTUB" Electrode Holder. The reinforced cable end may be either clamped or soldered to the "SHORTSTUB" according to common practice.

*Contact your local distributor or write direct for full information.*

**BERNARD** WELDING EQUIPMENT CO.
10232 S. Avenue 'N' · Chicago 17, Illinois

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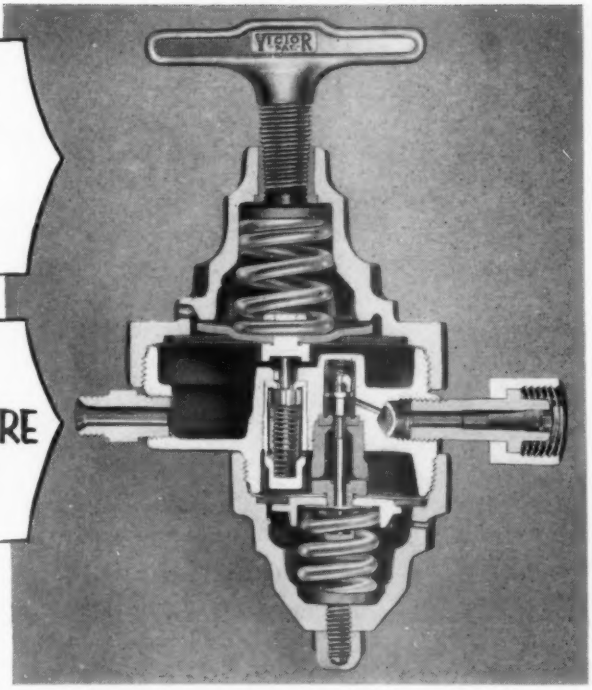
**Circle No. 70 on Reader Service Card.**

The man on the job prefers **VICTOR** Safety Regulators

**THIS INSIDE PICTURE TELLS WHY**




Cut-away of Model VTS400 series 2-stage Safety Regulator. Victor makes regulators for almost every gas and use, for pressures to 10,000 p.s.i., and volumes to 28,000 c.f.h.

**You Get Greater Safety.** All Victor regulators have "stem type" seat mechanism that closes with impact of inlet pressure, thus protects against seat ignition because the incoming gas loses its heat of compression by expanding into the inlet pressure chamber before passing over the seat and through the nozzle. High inlet pressure type regulators have reliable, self-reseating relief valve. Diaphragms protected from excessive, damaging movements by "stops" and rubber cushions. Porous sintered bronze inlet filter keeps out dirt, foreign material.

**Single and Two-stage Types.** Victor offers single-stage regulators to meet most capacity or delivery pressure requirements; and two-stage regulators for operations requiring a constant delivery pressure over a range of varying inlet pressures.

Standardize on Victor Safety Regulators, as so many other nationally-known companies do. Call your Victor dealer NOW.

**VICTOR for welding**

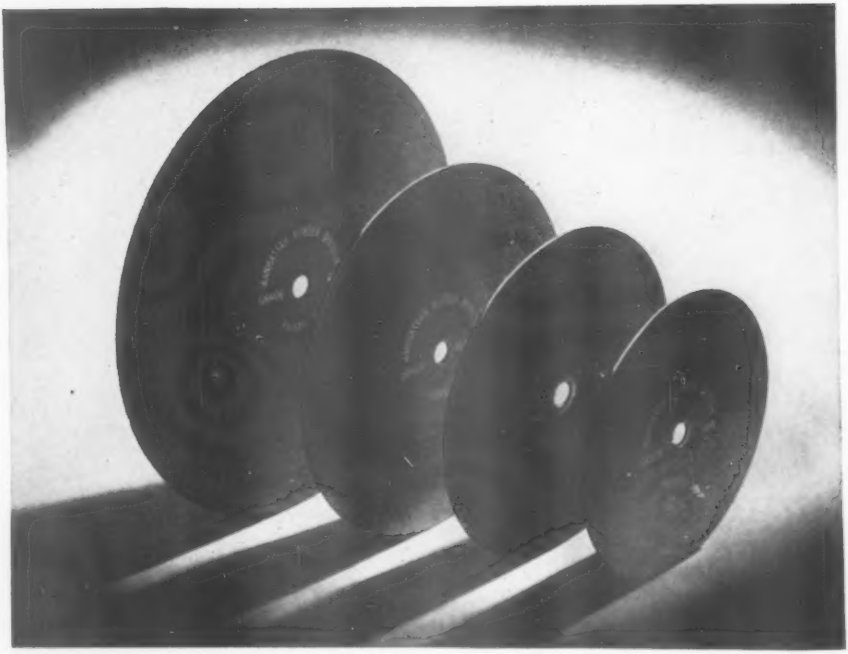
**VICTOR EQUIPMENT COMPANY**

Mfrs. of welding & cutting equipment; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines. 34

844 Folsom St.
San Francisco 7

3821 Santa Fe Avenue
Los Angeles 58

**Circle No. 155 on Reader Service Card.**



# Cleaner Cutting...Longer Wheel Life with MANHATTAN CUT-OFF WHEELS

Every Manhattan Cut-Off Wheel is custom-bonded to cut cleaner at higher speeds on specific cut-off jobs . . . with hardened steel, soft steel, light gauge tubing or critical alloys. Factory records of the number of cuts per wheel have proved they do a better job . . . and *last longer* than any other wheels!

Manhattan Cut-Off Wheels are custom-manufactured for your specific requirements in the widest range of types and sizes. Let a Manhattan Abrasive Wheel engineer show you how you can save time and money . . . get "More Use per Dollar" . . . with Manhattan Cut-Off Wheels and other types of high speed, heavy duty wheels.

RM-630R

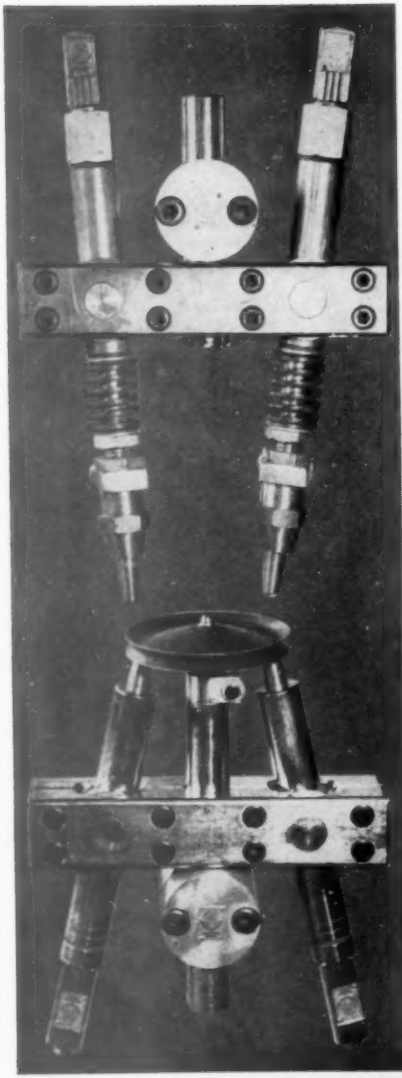
WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

**RAYBESTOS-MANHATTAN, INC.**

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose
Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles
Engineered Plastic, and Sintered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

Circle No. 134 on Reader Service Card.



*Confucius say;*
*". . . One picture is worth ten thousand words."*

# S-M-S

## Adjust-A-Angle Adapters with Adjust-A-Pressure Holders solve many welding problems.

Change from one electrode spacing to another--a matter of minutes--with same set-up.

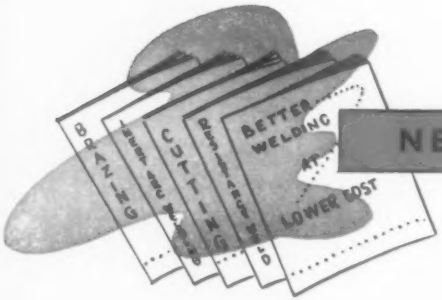
*May we discuss YOUR special welding problem?*

**FREE** Write for descriptive data on complete line of resistance welding electrodes, holders, wheels and special dies, forgings and castings.

## S-M-S Corporation

**8605 Livernois Ave. • Detroit 4, Mich.**

**Circle No. 137 on Reader Service Card.**




# NEW REFERENCE DATA

**The publications featured on these pages were written by experts. They are FREE to our readers. To obtain these helpful reference materials use postcard bound into this issue.**

**"ALUMINUM IN STOCK AT RYERSON"** is the title of a bulletin which should be a handy item in any shop library. Illustrated, 8-page catalog lists aluminum plates, sheets, rods and bars and formed panel sheets which Joseph T. Ryerson & Son, Inc., carry in stock. Company's forming, shearing, slitting and sawing facilities are highlighted. **Circle No. 192 on Reader Service Card.**

**NEW WELDING TORCH FEATURES QUICK SHUT-OFF VALVE.** Illustrated bulletin prepared by Air Reduction Sales Co. describes how the Airco Style 600 shut-off torch saves gas by eliminating carrying of "live" flame between welding areas. **Circle No. 193 on Card.**

**COMPLETE NEW PLUG WELD REPAIR KITS FOR CRACKED HEADS AND BLOCKS** are introduced in literature from Peterson Welding Laboratories, Inc. Components for Starter and Master Kits are listed and various types of plugs, taps and files used are illustrated. **Circle No. 194 on Reader Service Card.**

**WELDING HOSE REEL UNTANGLES PROBLEM** of handling double hose 150 ft. long according to illustrated data sheet issued by United Specialty Corporation. Elimination of safety hazards, longer hose life, convenience and easy installation are covered along with physical dimensions and capacities. **Circle No. 153 on Reader Service Card.**

**MAGNETIC SOLUTION TO PLATE ALIGNMENT PROBLEMS** is given in a 4-page folder from Portomag, Inc. Described and illustrated are electro-magnetic lift and clamp and new single and dual leverage adapters for use in welding stiffeners to plate. **Circle No. 131 on Reader Service Card.**

**WRENCHES FOR ACETYLENE WELDING,** including a description of an assortment of wrenches for acetylene tanks, are described in an illustrated bulletin prepared by The Chicago Hardware Foundry Co. Bulletin 608 contains cost data. **Circle No. 196 on Card.**

**COMPARISON CHART FOR SELECTION OF HARDSURFACING MATERIALS** is available from Rankin Mfg. Company. Punched for easy insertion in shop notebook, chart lists hardfacing application across the top. First column lists various manufacturers with their products appearing across the chart under specific applications where they are used. **Circle No. 216 on Service Card.**

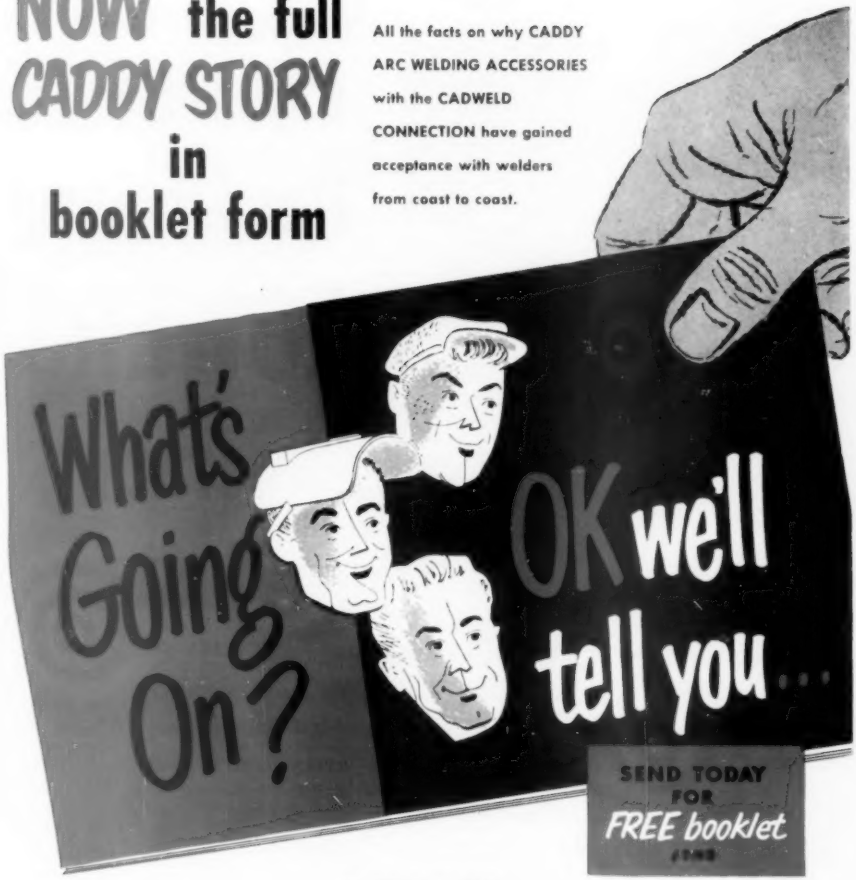
**WELDING MACHINE FILTERS** available for all standard makes of welding machines are shown in an illustrated loose-leaf brochure prepared by the Air Filter Corporation. Maker describes how filters will cut maintenance costs and raise machine usage. **Circle No. 46 on Reader Service Card.**

**"IT'S ALMOST MAGIC"** is the way Lewis Welding & Engineering Corp. describes its "Universal" automatic welding fixture in a colorful 4-page brochure. Design details and operating specifications are given. Typical applications are shown. **Circle No. 108 on Reader Service Card.**

*(Turn to Page 31)*

# NOW the full CADDY STORY in booklet form

All the facts on why CADDY ARC WELDING ACCESSORIES with the CADWELD CONNECTION have gained acceptance with welders from coast to coast.




## LEARN:

1. Why CADDY ELECTRODE HOLDERS—RUN COOLER, ARE LIGHTER, ARE MORE FULLY INSULATED.
2. How CADWELD CONNECTIONS are made.
3. The principal behind the CADDY ARC WELDING CIRCUIT—"a solid copper circuit from welding machine to electrode".
4. The 6 MAIN FEATURES of the CADDY TYPE "B" fully insulated electrode holder.
5. What CADDY has over all competition.

**CADDY®**
**ARC WELDING ACCESSORY DIV.**

**Erico Products, Inc.**
2070 E. 61st Place • Cleveland 3, Ohio
Distributed in Canada by CANADIAN GENERAL ELECTRIC

**Circle No. 86 on Reader Service Card.**

# COLMONOY Hard-Facing LOWERS Operating Costs

Longer equipment life means lowered operating costs. Make the fast-wearing parts in your equipment last longer by using Colmonoy hard-facing alloys and methods. There are Colmonoy alloys to protect against every form of wear.

Cut the cost of applying and finishing hard-facing deposits by using the Colmonoy Sprayweld Process. You'll spray on hard-facing that's quick, smooth, and welded to the surface of your part.

**WRITE RIGHT NOW**

For the Colmonoy Spraywelder Catalog and Hard-Facing Manual No. 79

*HARD-FACING & BRAZING ALLOYS*

**WALL COLMONOY CORP.**

15345 JOHN R STREET · DETROIT 3, MICHIGAN

*BIRMINGHAM · BUFFALO · CHICAGO · HOUSTON · LOS ANGELES*
*MORRISVILLE, PA. · NEW YORK · PITTSBURGH · MONTREAL · GREAT BRITAIN*

Circle No. 159 on Reader Service Card.

**MAGNETIC FORCE WELDERS AND HOW THEY ARE USED IN RESISTANCE WELDING** is the interesting story told in Bulletin MF-100 issued by Precision Welder and Flexopress Corp. Bulletin points out advantages of company's precision magnetic force welder and explains why it is highly successful in joining difficult-to-weld steels and dissimilar metals. **Circle No. 197 on Card.**

**FAST, ACCURATE PIPE WELDING AND HOW IT CAN BE DONE** is explained in literature from Jewel Mfg. Co. Described and illustrated are clamps for aligning and holding pipe for tacking and welding. **Circle No. 105 on Reader Service Card.**

**TURNING ROLLS: WHAT THEY ARE AND HOW TO USE THEM** is a quick way of summarizing contents of a turning roll catalog available from Aronson Machine Co. Besides describing and illustrating Aronson line of turning rolls, catalog gives some basic information on turning rolls and their application. **Circle No. 198 on Reader Service Card.**

**HOW NEW HEAVY DUTY AIR HAMMER OPERATES WITH MORE PUNCH** is described by Superior Pneumatic and Manufacturing Co. in illustrated bulletin. Bigger hammer—piston, 6 position safety chuck, are among features covered. **Circle No. 144 on Reader Service Card.**

**USE OF CARBON DIOXIDE GAS** for hardening cores and molds in foundries is subject of 16-page booklet from National Cylinder Gas Co. Discussed are advantages of the process, problems encountered and their solutions and materials and methods. **Circle No. 199 on Reader Service Card.**

**A NEW, LIGHTWEIGHT ELECTRODE HOLDER** is the subject of a folder offered by Duro Engineering Co. New 16 ounce model is said to give long, trouble-free service life. **Circle No. 84 on Reader Service Card.**

**STRONGER, MORE COMFORTABLE HEADGEAR** is Jackson Products, Inc. description for an important component part of their line of fiber glass safety hats and caps. Illustrated bulletin explains design advantage of having hammock straps and sweatband in one unit assembly. **Circle No. 200 on Card.**

**SILVER BRAZING ALLOYS, RINGS AND FLUXES** are the subject of data book offered by Goldsmith Bros. Smelting & Refining Co. Book gives valuable information on use of each product. **Circle No. 90 on Reader Service Card.**

**A REVOLVING WHEEL CUP GUARD FOR PORTABLE GRINDERS** is introduced by Morrison Products, Inc., in a colorful, 4-page brochure. New guards are described and illustrated; dimensions and specifications are given. **Circle No. 121 on Reader Service Card.**

**"THE WORLD'S FINEST EXHAUST SYSTEMS"** are the subject of a 4-page illustrated folder from Engwald Corp. Described and illustrated are exhaust systems for weld fumes, automotive and industrial systems. Blowers and crushproof rubber hose are also covered. **Circle No. 167 on Reader Service Card.**

**A PIPE CUTTING AND BEVELING MACHINE** and all its advantages are featured in a 4-page illustrated, folder from H & M Pipe Beveling Machine Co. Design details and operating specifications are given for unit which is said to speed up pipe cutting and fabrication work. **Circle No. 99 on Service Card.**

**POWER SHEAR** for cutting angles and flats is described fully in a new catalog prepared by Bateman Machine & Foundry Co. Literature is illustrated and describes machine's versatility. Shear has attachment for punching holes in plate. **Circle No. 66 on Reader Service Card.**

**HOW NEW SPOT WELDER SPEEDS PRODUCTION** is the story told in illustrated literature available from Aro Spot Welders, division of Guthery Machine Tool Corp. High current for welder size plus levered lower arm are said to do the trick. **Circle No. 206 on Reader Service Card.**

*(Turn to Page 32)*

**A NEW CONCEPT IN THE FIELD OF ELECTRIC PLANTS** is introduced by International Fermont Machinery Co., Inc., in an 8-page manual entitled "Engineering Kilowatts." Bulletin No. 955 contains reference material, forms and check lists for kilowatt-producing machines. Powered by internal combustion engines, electric plants range in capacity from 5 KW through 250 KW and are designed for automatic or manual starting. **Circle No. 202 on Service Card.**

**OIL-RESISTANT WELDING CABLE** made by Belden Mfg. Company is featured in Bulletin 7802. Complete facts are given on welding cable construction and tests which cable must meet are described in detail. Similar information is given on welder power supply cable and welder supply cord. **Circle No. 65 on Reader Service Card.**

**BRONZE ELECTRODES AND HOW TO USE THEM FOR MAINTENANCE AND REPAIR** is the subject of Bulletin W-25a available from Ampco Metal, Inc. Attractively illustrated, 4-page application bulletin describes characteristics, properties and sizes of five grades of electrodes, filler rod, coiled wire and brazing rods. Typical applications are listed for each. **Circle No. 57 on Card.**

**ANTI-SPATTER COMPOUND** is the subject of a new and informative piece of literature prepared by The Midland Paint & Varnish Co. Points out how to reduce cleaning costs with NO SPAT welding fluid. Also said to suppress fumes and rust. **Circle No. 119 on Service Card.**

**NEW CATALOG SHEETS AND SUGGESTED SALES PRICE LISTS** just issued by Aljay Mfg. Co., Inc., are numbered to conform to National Welding Supply Association Code-Index numbers. Firm makes a complete line of welding clothing, gloves and welding curtains. **Circle No. 49 on Reader Service Card.**

**A HOT ITEM FOR DISPELLING COLD** is described in an illustrated bulletin available from Weldit, Inc. about their new line of salamanders. Greater heating efficiency through redesign is claimed for several available models. **Circle No. 160 on Reader Service Card.**

**TAILORED-TO-FIT MANGANESE TOOTH REPOINTERS** are featured in an illustrated catalog sheet from Industrial Overlay Metals, Inc. Punched for easy insertion in shop notebooks, sheet describes and illustrates two types of cast-to-shape repointers and gives application instructions and price data. **Circle No. 103 on Reader Service Card.**

**RUGGED AND DEPENDABLE CHIPPING HAMMERS** are the subject of illustrated folder from Chicago Manufacturing & Distributing Co. Featured three types of wood handled tools and four types of steel handled tools, all with rugged forged steel heads. **Circle No. 75 on Card.**

**"LOWER MANUFACTURING COSTS"** is a booklet which presents a new look at nondestructive testing systems. Available from Magnaflux Corporation, illustrated, 8-page booklet explains how company's various nondestructive testing methods, including Magnaflux, Magnaglo and Zyglo processes, can be applied to weldments and other industrial applications. **Circle No. 113 on Reader Service Card.**

**COMPLETE LINE OF TOGGLE CLAMPS** and all their features are to be found in Catalog 5 issued by West Point Mfg. Co. Catalog explains how each clamp is engineered for longer life and more positive work holding. **Circle No. 163 on Reader Service Card.**

**AN ALUMINUM ELECTRODE WITH PRESSURE EXTRUDED CONCENTRIC COATING** is introduced in a catalog from Eutectic Welding Alloys Corp. Eutec-Trode 2101 is described as being adapted for use on heat treated aluminum, such as 24ST and 17ST. Deposits are said to be smooth, dense and free of porosity. **Circle No. 203 on Reader Service Card.**

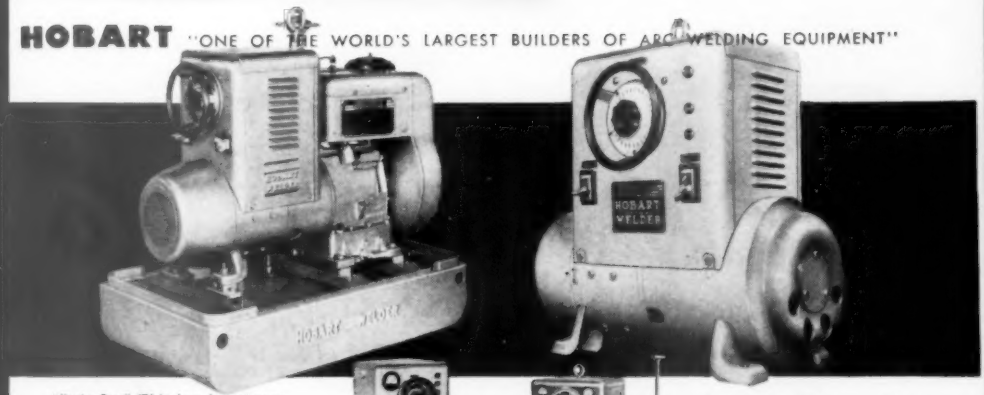
**ADVANTAGES OF POSITIONED WELDING** are outlined in positioner catalog offered by Cullen-Friestedt Co. Described and illustrated is complete line of hand and power operated models in capacities up to 30,000 lbs. and larger. **Circle No. 79 on Reader Service Card.**

*(Turn to Page 35)*



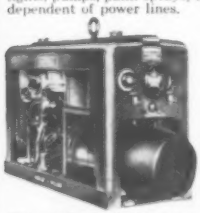
**Circle No. 96 on Reader Service Card.** →

**HOBART** "ONE OF THE WORLD'S LARGEST BUILDERS OF ARC WELDING EQUIPMENT"

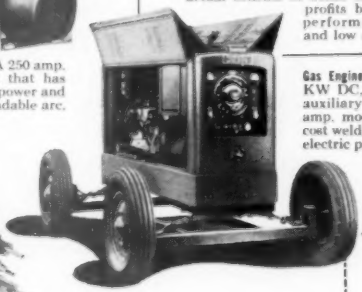


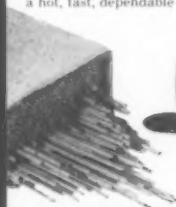

**"Husky Boy."** This low investment, lightweight 200 amp. air-cooled model is perfect for general shop and outside repair work. Easily mounts on truck or trailer. Portable mountings available.

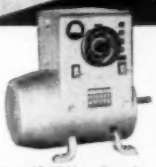
**Air-cooled AC Power—AC Welder.** It's a 2-in-1 unit. It welds anywhere or supplies power for operating tools, lights, pumps, paint sprays, etc., independent of power lines.



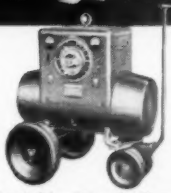
**Contractor Special.** A 250 amp. gas drive model that has plenty of engine power and a hot, fast, dependable arc.







**AC Power—AC Welder.** Couple this model directly to your gas engine by means of a V-belt or pulley and you can weld or have emergency power when and where you need it on a moment's notice.



**Electric Drive.** 300 and 400 amp. welders. Ideal for production, maintenance and repair service. Conservative rating lets you do heavy duty welding for limited periods of time.

# IT PAYS to COMPARE with HOBART for greater welder value!

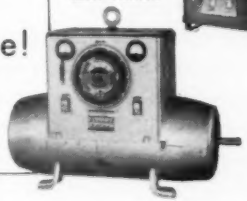
The best proof of Hobart's superior advantages and values is comparison with other welders. Try a Hobart—you'll see why you get more actual benefits in dollar savings and increased profits because of its higher performance, faster welding and low cost operation.

**Gas Engine Welders** with 1 or 3 KW DC, or 6 or 12 KW AC auxiliary power. 200 to 600 amp. models for speedy, low cost welding in the field where electric power is not available.

**"Bantam Champ."** 250 amp. welder especially designed for light to medium requirements. Popular for all fabrication purposes in the 200 to 250 amp. class.

**Transformer Welders.** 180 to 500 amp. models for shops that have only single phase power. Exceptional high efficiency and low cost maintenance.

**DC Rectifier.** 300 amp. Has three delta connected transformer . . . magnetic line switch . . . overload protection, plus remote control.



**Generator Only.** 200 or 300 amp. with 1 KW 110 volt DC power outlet for "Building Your Own." Just couple it direct or V-belt it to a good gasoline engine.

**You can't beat HOBART electrodes**

A simple comparison will prove Hobart's superior, top quality welding—in every application. You'll be surprised at the real difference in Welding Electrodes. Get the extra speed that means lower production costs—Try Hobart.

**HOBART BROTHERS COMPANY**
Box HW-1061, TROY, OHIO • PHONE 21223

HOBART BROTHERS CO., BOX HW-1061, TROY, OHIO, PHONE 21223
Please send me complete information on the following:

☐ "Husky Boy" ☐ AC Power—AC Welder ☐ "Build Your Own"
☐ Contractor Special ☐ Electric Drive ☐ "Bantam Champ"
☐ Transformer Welders ☐ DC Rectifier ☐ Gas Engine Welders
☐ Generator Only

NAME _____ POSITION _____

FIRM _____

ADDRESS _____

CITY _____ STATE _____

# One hammer does the work of Seven

Hammers used to crush limestone and shale remain in operation for 70 weeks now that they are hard-faced with HASCROME high-chromium rod. Unprotected hammers are completely unserviceable after operating for only 10 weeks under the same conditions. Periodic rebuilding with the inexpensive iron-base rod resulted in one hammer doing the work of seven.

HASCROME rod is widely used to protect rock crushing and earth moving equipment because of its resistance to impact and abrasion. This tough, work-hardening alloy is also an excellent build-up material.

See your local dealer for more information on the complete line of 18 HAYNES hard-facing alloys. If you don't know the location of your local dealer, write to Haynes Stellite Company, a Division of Union Carbide and Carbon Corporation, Kokomo, Indiana.

*See...* Your local Haynes Stellite Dealer

*or*

*Write...* to Haynes Stellite Company

The terms "Haynes," "Haynes Stellite," and "Hascrome" are registered trade-marks of Union Carbide and Carbon Corporation.

**Circle No. 95 on Reader Service Card.**

## NEW REFERENCE DATA

from page 32

**ELECTRODE HOLDERS WHICH REDUCE STUB WASTE TO A MINIMUM** are featured in "Shortstub" catalog offered by Bernard Welding Equipment Co. Illustrated, 4-page brochure lists holder sizes, prices and catalogs replacement parts. **Circle No. 70 on Reader Service Card.**

**IMPACT AND CORROSION RESISTANT STEEL PLATE, SHAPES AND FORMS** are featured in literature from Allied Steel & Tractor Products, Inc. Characteristics are given and welding techniques are suggested. **Circle No. 50 on Reader Service Card.**

**SEAMLESS WELDING FITTINGS AND FLANGES** available from Babcock & Wilcox Co. are described and illustrated in colorful 6-page brochure. Bulletin FB-502 lists a complete range of types and sizes of fittings and flanges available in carbon, alloy and stainless steels. **Circle No. 204 on Service Card.**

**COMPLETE CLAMP CATALOG** offered by Cincinnati Tool Co. features a line of clamps for every industrial application. Heading the list are welding clamps with spatter-resisting screws. Selection and application information is furnished. **Circle No. 76 on Reader Service Card.**

**STANDARD AND SPECIAL RESISTANCE AND ARC WELDING EQUIPMENT** made by Acro Welder Mfg. Co. is subject of 12-page illustrated Bulletin No. 156. Covered are single and multiple head welders for semi- and fully-automatic operations. Specially designed work positioning fixtures are discussed. **Circle No. 205 on Reader Service Card.**

**THIRTY-TWO PAGE, POCKET SIZE BUYER'S GUIDE FOR ALLOYS AND FLUXES** is loaded with data on welding, brazing, soldering, cutting and tinning materials. Twice the number of alloys previously listed, automatic fluxing systems and hardening compounds make this guide from All-State Welding Alloys Co. Inc., a must. **Circle No. 52 on Reader Service Card.**

**UNFIRED PRESSURE VESSEL CODE SIMPLIFIED** is the title of a simplified guide to that Code and its use. Included are simplified charts for internal and external pressure shell thickness, flanged dished head thickness and flat cover plate thickness. Welding procedure qualifications are covered. Book is written by Robert Chuse who has a wide background in welded fabrication of pressure vessels. **Circle No. 207 on Reader Service Card.**

**HOW TO ELIMINATE MOISTURE ABSORPTION** in welding electrodes is explained in data sheet offered by Despatch Oven Co. Described in detail and illustrated is "WRD" oven which holds 250 lbs. of electrodes in 10 separate compartments. **Circle No. 80 on Card.**

**LARGE, SELF-STICKING ACCIDENT PREVENTION SIGNS** are subject of colorful, illustrated 16-page Bulletin 145-C offered by W. H. Brady Co. Bulletin describes complete line of accident prevention signs which warn against industrial hazards. **Circle No. 208 on Reader Service Card.**

**HIGH SPEED SURFACING ELECTRODES** are introduced by Marquette Manufacturing Co. in complete brochure. Impact and abrasion resisting deposits which harden to 550 Brinnell are obtainable with No. 285 Hard Rod, a contact type austenic electrode. **Circle No. 209 on Card.**

**CARE AND REPAIR OF WELDING HOSE** is explained in a handy little folder offered by Craig Welding Supply Co. Besides giving helpful hints on this important subject, folder explains how company's ferruling tool can be used to crimp ferrules on 3/16-inch and 1/4-inch single or twin welding hose. **Circle No. 210 on Reader Service Card.**

**TREATED WELDING CURTAINS WHICH CAN CONFINE YOUR DANGER** are featured in literature from A. Smith & Son, Inc. Folder explains how protective curtain holds in sparks and flames. Patented impregnating process used to make close woven canvas fireproof is described. **Circle No. 140 on Reader Service Card.**

*(Turn to Page 36)*

**FLAT TYPE WELDING RINGS AND HOW THEY ARE USED IN SUBMERGED ARC WELDING** is explained thoroughly in Form TT750 available from Tube Turns. Colorful, 4-page brochure gives step-by-step instructions for use of rings with knock-off spacer pins in automatic submerged arc welding. Use of rings in general manual welding applications is also explained. **Circle No. 211**

**A FLUX FOR EVERY WELDING, BRAZING OR SOLDERING JOB** is featured in brochure from Anti-Borax Compound Co., Inc. Booklet describes safe, non-toxic qualities of "anti-borax" fluxes and tells why they give better, cleaner and stronger joints. **Circle No. 59 on Card.**

**HEAD AND EYE PROTECTION EQUIPMENT** made by Dockson Corporation is featured in an illustrated folder. Described and illustrated are about 30 of the most popular items in the company's line of goggles for welding operators and chippers, plastic eye savers, spectacle type goggles, eye shields, helmets, masks, hats and lenses. **Circle No. 212 on Reader Service Card.**

**HOW TO CONVERT YOUR PICKUP TRUCK** into a "carry-it-all" vehicle is explained in literature from Mustang Mfg. Co. Described is stock rack-cab guard-pickup box assembly which can be mounted on pickup trucks to carry steel, lumber and other materials. Brochure describes 24 different models available. **Circle No. 122 on Reader Service Card.**

**DRILL YE TERRIERS, DRILL! . . .** but do it with new general purpose Holgun advises Black & Decker Mfg. Co. in a colorful bulletin describing their ¼-inch portable drill. Light-weight, smooth operating characteristics claimed for the intermittent duty tool are explained. **Circle No. 213 on Reader Service Card.**

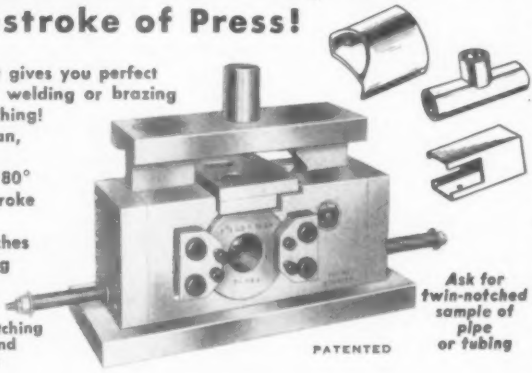
*(Continued on Page 156)*

*the* **ARC-TWIN** *Cuts Two Perfect Notches*

**in *One* Downstroke of Press!**

**SAVING both time and cost, it gives you perfect T-joints — instantly ready for welding or brazing without deformation or finishing! Twin-acting punch shears clean, from inside out, leaving two matching notches (in perfect 180° alignment) with every downstroke of the punch press. Quickly interchangeable dies and punches accommodate pipe and tubing from ½" to 2⅜" O.D.; special units, up to 3" O.D.**

**Special Arc-Twins for double notching stainless steel or monel metal and units built to your specifications can also be furnished.**



PATENTED

***Ask for twin-notched sample of pipe or tubing***

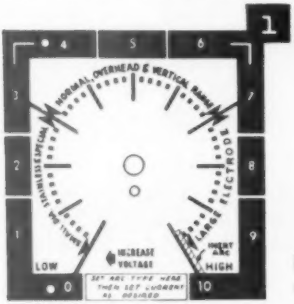
**VOGEL TOOL AND DIE CORPORATION** 1819 North 32nd Ave. Melrose Park, Illinois

**Circle No. 156 on Reader Service Card.**

ONLY the

# VICKERS* Controlarc DC Welder

## offers ALL 3 of these advanced features for more versatile and more rugged welding performance



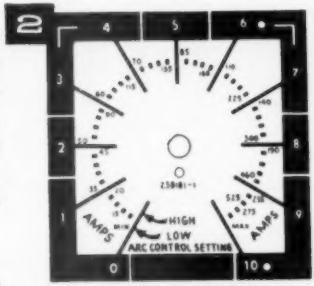

ARC CONTROL

**1 SELECTION OF ARC TYPE**

required for vastly different welding jobs, and adjustment necessary to suit the individuality of the operator and the welding job.

**DUAL CONTINUOUS CONTROL**

in a rectifier machine. Can vary the current from minimum to maximum, and vary the type of arc, in continuous stepless self-indicating dials.




CURRENT CONTROL

**3 REMOTE CONTROL**

of both these functions in a handy box that plugs into the front of the welder can save floor space by mounting welder out of precious production area.

***for heavy continuous production jobs — this welder can TAKE IT!***

PLUS these additional optional exclusive features:

- **CONSTANT POTENTIAL (CP) ADAPTOR**
- **SLOPE CONTROLLER**

*TRADEMARK

*WRITE TODAY for Complete Information on this Outstanding Welder*

**VICKERS ELECTRIC DIVISION**

VICKERS INCORPORATED a unit of Sperry Rand Corporation
1855 LOCUST STREET • SAINT LOUIS 3, MISSOURI

**Circle No. 154 on Reader Service Card.**

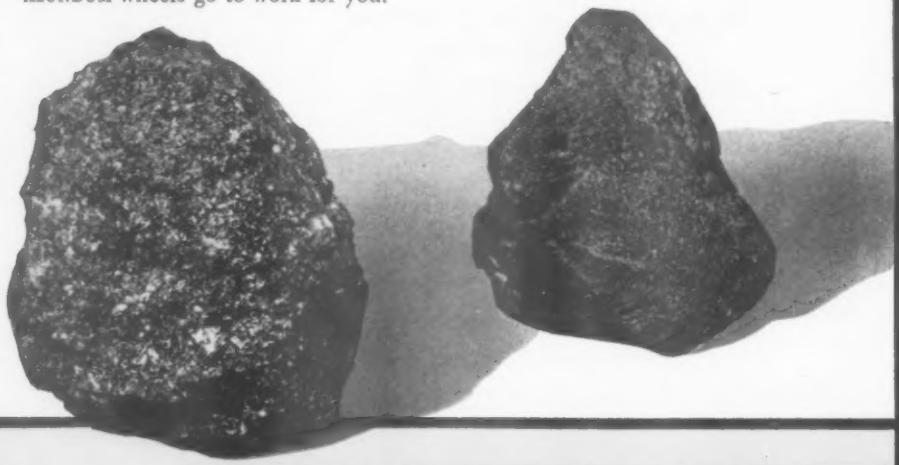
Announcing...New

# 44

# ALUNDUM* abrasive

...a revolutionary NORTON development bringing new "TOUCH of GOLD" economy to weld grinding

*You Can SEE The Difference!* The new Norton 44 ALUNDUM abrasive (at right) differs radically in appearance from ordinary aluminum oxide abrasive. The finer grain structure of "44" indicates its much denser, tougher composition. And the money-saving performance of this modern new abrasive is just as easy to spot — every time 44 ALUNDUM wheels go to work for you.



In new 44 ALUNDUM abrasive Norton brings you a combination of grinding quality and economy never before equalled in a non-premium priced abrasive.

We want to emphasize that point. Although the new "44" is non-premium priced, right there its resemblance to any ordinary aluminum oxide abrasive ends abruptly. It is definitely different and better in every way.

*"44" is made differently,* by a special Norton-developed electric furnace process that results in extreme toughness and ruggedness.

*"44" performs differently.* Compared to other non-premium priced aluminum oxide wheels the new 44 ALUNDUM wheels cut faster, grind cooler, last longer. Made under closest quality control they have the perfect balance that makes them "hug that work" with less vibration and bounce. These "Touch of Gold" advantages mean minimum operator fatigue and lower weld grinding costs.

*"44" is job-proved.* Over 1100 different tests were made on the new 44-ALUNDUM wheels, in plants of all kinds throughout the country. Here are some typical reports.

*"Faster cutting, better finish, much less burn."*

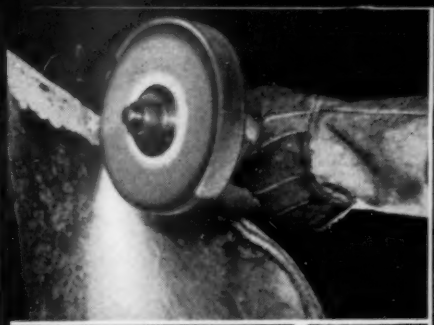
*"Four times longer lasting, with equal rate of cut."*

*"Production increased 46% per wheel, with best duplication EVER received."*

Take advantage of this outstanding new abrasive value. See your Norton Distributor for 44 ALUNDUM wheels in the bonds, wheel types and sizes you need. Or write to the nearest district office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

W-1743

**Circle No. 128 on Reader Service Card.**



**NORTON**

**ABRASIVES**

*Making better products... to make your products better*

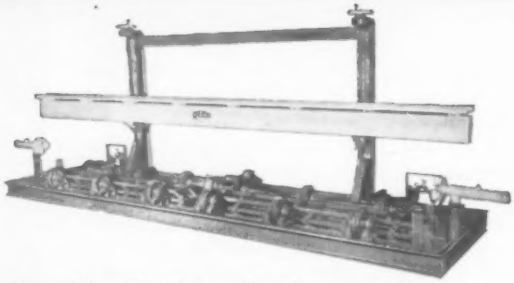
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories

BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones Behr-cat Tapes

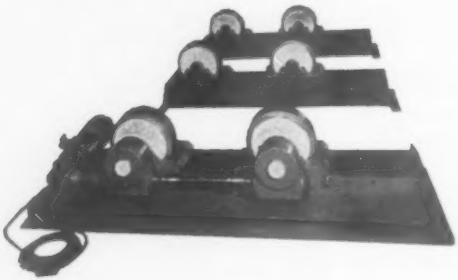
*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

# WEBB TANK PRODUCTION MACHINERY

## REED TRACK SUPPORTS
### For Automatic Welding Head Carriages

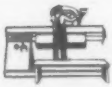


**Increase production — use this fixture on 4' to 12' diameter work. Welding track is 24' to 34' long. Powered vertical adjustment is available for all models. May be used with your present turning rolls, welding positioners, special jigs for straight seam work, or portable type rolls illustrated below.**



## REED Portable Type TURNING ROLLS

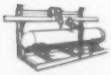
**For manual or automatic welding and other operations requiring rotation of a cylindrical vessel. Capacities range from 3 tons to 75 tons; larger units built to special order. Powered by electric motor with variable speed transmission. Readily portable, they may be used free or anchored to the floor as desired.**



Horn Type Fixtures

Cylinder Flange Offsetters

Assembly Fixtures



Unit Type Turning Rolls

Portable Turning Rolls

Automatic Welding Track Supports

**FOR ILLUSTRATED LITERATURE WRITE DEPT C.**

REED EQUIPMENT DIVISION
THE WEBB CORP. WEBB CITY, MO. U. S. A.

**Circle No. 158 on Reader Service Card.**

**STAINLESS STEEL WELDING WIRE...**

**Spooled** . . . layer wound to assure a smooth, even feed. Sizes: .035", .045", 1/16", 5/64" and 3/32" diameters.

**Coiled** . . . layer wound on rims for submerged arc welding. Sizes: 1/16", 5/64", 3/32", 1/8", 5/32", 3/16" and 1/4" diameters.

**Cut Lengths** . . . straightened and cut wire furnished in 36" lengths for inert arc and gas welding. Sizes: .035", .045", 1/16", 5/64", 3/32", 1/8", 5/32", 3/16" and 1/4" diameters.

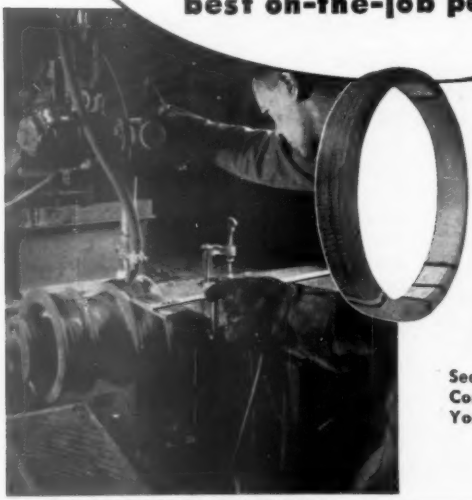
**Two factors give**

# Drawalloy

**CORPORATION**

**WELDING WIRE**

**best on-the-job performance**



Drawalloy welding wire is a product of two factors—years of experience in the welding industry combined with the best wire mill drawing practices. The result is clean welding wire with the proper finish, temper, diameter tolerance and chemical analysis. It's a wire that produces the highest quality welds continuously—with an easy, sure feed and a constant, smooth arc.

**See your distributor or write Drawalloy Corporation, Lincoln Highway at Alley St., York 11, Pennsylvania**

**WEAR-O-MATIC HARD-FACING WIRE...**

**Coiled** . . . precision drawn for perfect roundness to insure continuous, smooth feed with any automatic head. Available in six Types for hard-facing applications.

**Drawalloy**
**CORPORATION**
The Wire Mill For The Welding Industry

**YORK 11, PENNSYLVANIA**

**Circle No. 83 on Reader Service Card.**

## Resistance Welding: Theory and Use

Prepared by the Resistance Welding Committee, American Welding Society, "Resistance Welding: Theory and Use" gives full details on all six resistance welding process, machines, controls and electrodes. It covers welding of different metals, weld quality, inspection and testing. Newest developments, such as slope control and welding of aluminum, receive full attention.

Well illustrated and containing 163 pages, book costs $4.50 per copy and is available from Reinhold Publishing Co., 430 Park Ave., New York 22, N.Y.

## Cold Bending of Metals and Abrasive Cut-Machining

This 170-page book covers two lesser known metalworking processes: cold bending of metals and abrasive-cut machining. Well illustrated book is published by Wallace Supplies Mfg. Co., 1304 Diversey Parkway, Chicago 14, Illinois, and is available at $2.50 per copy.

Book is divided into two sections. The first describes bending of tube, pipe and structural shapes, covering tools, design and theory. Second section explains abrasive-cut machining, covering speeds, quality of cuts and cutting of materials otherwise not cutable.

## Industrial Arts Arc Welding

This new 56-page booklet is for supervisors, teachers and students of industrial arts. It introduces the subject, relates it to industrial arts curriculum and suggests how to teach it. Equipment, techniques, safety and projects are covered.

Author is William A. Sellon, Department of Industrial Arts, Ohio University. Book is published by James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio. Price is $.25 per copy, postage prepaid in United States—$.50 elsewhere.

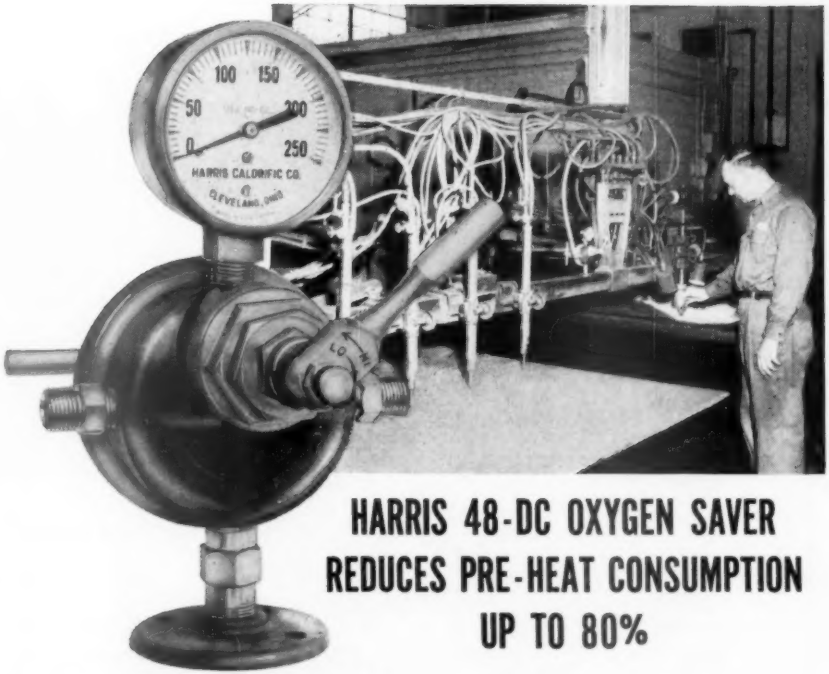
## Stainless Pipe and Tube Welds

A 27-page booklet has been prepared by the American Welding Society Committee on Piping and Tubing and is called "The Welding of Austenitic Chromium - Nickel Steel Piping and Tubing." It covers joint problems and design, welding grades with weld and base metal properties, welding processes and techniques, and inspection methods.

The booklet is complete with useful reference tables on material composition and electrode specs. It is available from A.W.S., 33 West 39th St., New York 18, N. Y. for $1.00.

## Metals Handbook: 1955 Supplement

This supplement to the ASM




# HARRIS 48-DC OXYGEN SAVER REDUCES PRE-HEAT CONSUMPTION UP TO 80%

A flick of the wrist controls pre-heat oxygen pressures to as many as eight machine cutting torches simultaneously. Now with the new Harris 48-DC Oxygen Saver you get up to 80% reduction in consumption of pre-heat oxygen.

Write us today for further details, or call your nearest Harris distributor.

- ✓ Up to 50% faster cutting speeds over older methods.
- ✓ Overall oxygen consumed lowered as much as 20%.
- ✓ Slag removal reduced to a minimum.

HARRIS

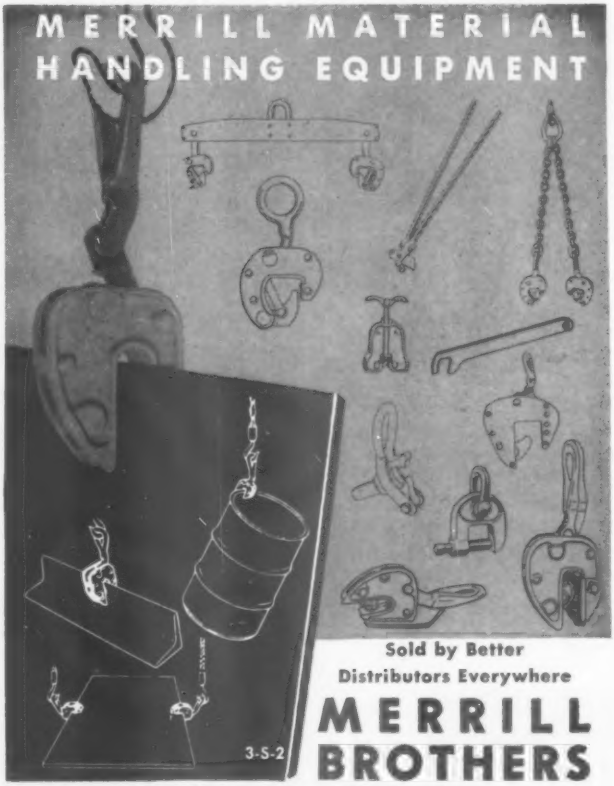
**HARRIS CALORIFIC CO.**

**5500 CASS AVENUE**
**CLEVELAND 2, OHIO**

**Circle No. 94 on Reader Service Card.**

Metals Handbook follows the general plan used in the 1954 Supplement, which is to give practical information on a wide variety of metalworking subjects that require up-to-date reference material. It contains 21 articles, written by 19 technical committees of the Society, comprising 179 authors. These articles are divided among four main sections: Metals and Applications, Design and Application, Processing and Fabrication and Testing and Inspection.

Book contains 208 pages, 214 tables, 256 charts and 411 illustrations. It is published by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. Price is $6.00.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How do regulators work — what is the difference between a single and a two stage reduction regulator — how does a gauge differ from a flowmeter—why are some regulators hard to adjust—what is a line regulator — what modern safety protection should a good regulator possess — what does the regulator inlet filter do — are big springs and large diameter diaphragms an advantage — how should one order a regulator

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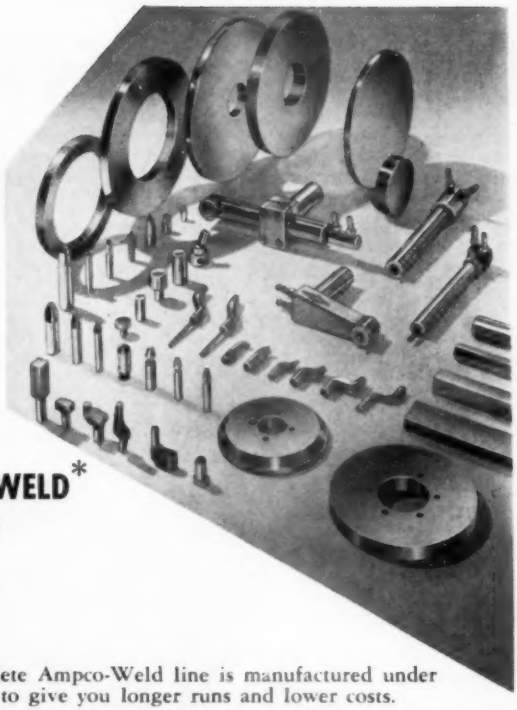
# You've Got What It Takes

## for longer runs and lower costs

...when you use **AMPCO-WELD*** resistance-welding products



Every item in the complete Ampco-Weld line is manufactured under strict laboratory control to give you longer runs and lower costs.

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- **AMPCO-WELD rod** — is available from stock — either in rounds, including hex, or in square and rectangular bars. There's a size for every need — all feature Ampco toughness and high electrical conductivity.
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- **AMPCO-WELD resistance-welding holders** — to suit every job — straight, offset, and universal ejector models. Offset and universal holders have interchangeable sockets for No. 1 and No. 2 Morse tapers. You change tapers without changing holders.

All Ampco-Weld resistance-welding products meet or exceed RWMA specifications. Experienced engineering service is also available. Get what it takes to lower your resistance-welding costs — get Ampco-Weld, the best value for your resistance-welding dollar.

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## P&H DC Rectifier Welders

# Cut Power Costs Nearly 30%

You take a big slice out of welding costs with the P&H DC Rectifier Welder. It can reduce your power bill for welding operations by nearly 30% because it uses less current under load, and practically no power during idle and no-load periods.

This P&H DC Welder gives you lower maintenance costs, too. There are no moving parts to wear out — no brushes, bearings, commutators, or brush riggings to replace — no costly downtime.

You produce better welds — put down more metal with the P&H DC Rectifier Welder because it has the exclusive P&H Dial-lectric Control that gives you instant, exact heat. Just a twist of the wrist results in quick response within the entire working range.

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# Literature Featured In Ads This Month

TO GET ANY OF THE REFERENCE DATA DESCRIBED HERE, CIRCLE THE APPROPRIATE NUMBER ON THE READER SERVICE CARDS IN THIS ISSUE

**45** **Bending Blocks or welding platens.** Several sizes of cast steel blocks available are described in folder. ACORN IRON & SUPPLY CO. Page 172.

**53** **Strong aluminum structures** and how to get them are described in detailed bulletin. ALUMINUM COMPANY OF AMERICA. Pages 80-81.

**54** **Strong, eye appeal welds** are easy according to Publication B-13 covering copper alloy welding rods. AMERICAN BRASS COMPANY. Pages 64-65.

**55** **Hardfacing electrodes** for long wear are described in complete catalog. AMERICAN MANGANESE STEEL DIV., AMERICAN BRAKE SHOE CO. Page 99.

**56** **Figure on cowhide gloves** for flexible, strong, heat resistant hand protection advises company in illustrated bulletin. AMERICAN OPTICAL COMPANY. Page 18.

**60** **Torch cutting cast iron** is described in case history book describing Arcair torch. ARCAIR COMPANY. Page 131.

**163** **Weld cleaning hammers** with tough, induction hardened blades are described in bulletin covering complete line. ATLAS WELDING ACCESSORIES INC. Page 147.

**69** **Stronger welds faster** is covered in booklet, "Bronze Welding — Modern Tool of Industry." BRIDGEPORT BRASS COMPANY. Page 103.

**72** **Cable connector kit** is described thoroughly in catalog No. 131 with complete instructions for its use. CAM-LOK DIVISION, EMPIRE PRODUCTS, INC. Page 154.

**73** **Right before your eyes** are the eye protection products covered in complete catalog. CHICAGO EYE SHIELD COMPANY. Page 46.

**78** **Automatic stainless welding wire** in spools, coils or cut lengths, is the content of complete catalog on quality-claimed products. CRUCIBLE STEEL COMPANY OF AMERICA. Page 104.

**83** **Precision drawn hard-facing wire** for continuous, smooth feed with any automatic head is described in literature. DRAWALLOY CORP. Page 41.

**86** **Arc Welding accessories** including electrode holders, cable connectors and welding circuits described in booklet form. CADDY ARC WELDING ACCESSORY DIV., ERICO PRODUCTS, INC. Page 29.

**88** **Engine-driven welders** that reduce delays—save time and money are featured in informative booklet. GENERAL ELECTRIC CO. Pages 52-53.

**93** **DC rectifier welders** that operate at 30% lower power costs is claim of complete literature. HARNISCHFEGER CORPORATION. Page 49.

**94** **How new device saves oxygen** is explained in brochure. HARRIS CALORIFIC COMPANY. Page 43.

**102** **Welding flux recovery systems** and how they can save money are described in folder. INVINCIBLE VACUUM CLEANER MFG. CO. Page 163.

**92** **How Silver brazing alloy cuts metal parts costs** is the subject of Bulletin 20 giving full details. HANDY & HARMAN. Page 16.

**107** **Welding, brazing and soldering fluxes** covered in latest bulletin. KREMBS & COMPANY. Page 173.

**111** **How CO2 saves money** in metal-arc gas shielded welding is explained in technical bulletin. LIQUID CARBONIC CORP. Page 157.

**112** **Electrode holders preferred by welders** is the way it's told in illustrated bulletin. LENCO, INC. Page 145.

**115** **Durable welding tip holder** with outstanding advantages featured in tells-all brochure. P. R. MALLORY CO. INC. Page 56.

**134** **Cut-off wheels** is the subject of complete catalog listing advantages. RAYBESTOS - MANHATTAN, INC. Page 26.

**117** **Iron powder electrodes** for high speed, all-position welding are covered in informative brochure. METAL & THERMIT CORPORATION. Page 121.

**118** **Ceramic hard facing** and its advantages for bearing surfaces explained in Bulletin 127. METALLIZING ENGINEERING CO., INC. Page 23.

**128** **Economical weld grinding** through use of radically different abrasive is explained in detailed bulletin. NORTON COMPANY. Pages 38-39.

**132** **Press welder** which incorporates many advanced design features described in detailed bulletin. PROGRESSIVE WELDER SALES COMPANY. Page 11.

**137** **Resistance welder accessories** completely described in data sheets. S-M-S CORPORATION. Page 27.

**161** **Fast starting AC welder** is given the full-information treatment in colorful brochure. WESTINGHOUSE ELECTRIC CORPORATION. Page 7.

**70** **How welding Cable Splint ends fraying** at electrode holder connections is explained in illustrated literature. BERNARD WELDING EQUIPMENT CO. Page 24.

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## MULTIMATIC UNIVERSAL REBUILDER (Model 1-A) for High Production Automatic Hard Surfacing

Rebuild rollers, idlers, crusher rolls, concaves, or any part of crawler tractors, shovels, excavators, and overhead cranes, etc., with MULTIMATIC—50% faster. Universal features enable this machine to handle almost any job at infinite variable speeds. Column rotation permits handling of other fixtures or straight line welding.

- **Turn table capacity 3000#**
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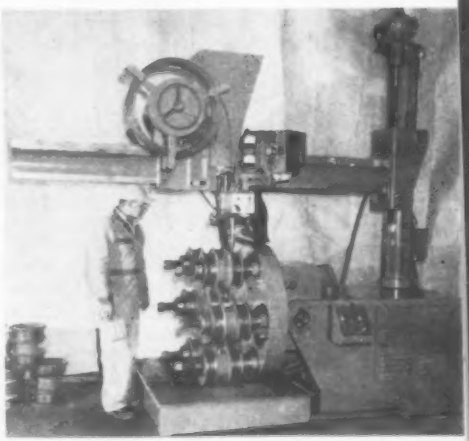
- **Power tilt and beam lift**
- **360° column rotation**
- **Automatic carriage step-over advance with spindle rotation.**



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**13454 Watertown Plank Rd.**
**Elm Grove, Wisconsin**
**Phone: Milwaukee—Sunset 2-6400**

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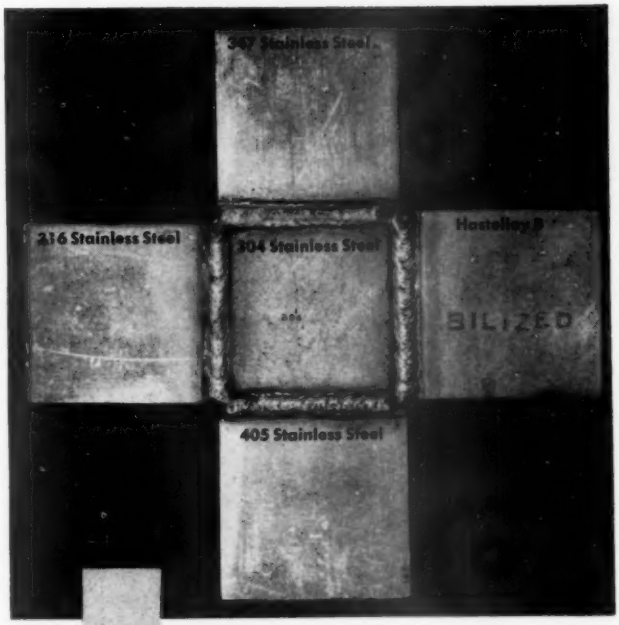


**Inco-Rod "A"** produces strong, sound, ductile welds in a wide variety of dissimilar alloys. In *this* test specimen it joined four different alloys to the Type 304 Stainless Steel plate at center.

# Versatility is the big plus you get only with Inco-Rod "A"

**In this 4-to-1 test specimen,** Type 304 Stainless Steel is joined to Types 405, 316, and 347 . . . and to Hastelloy B.

There's *proof* of versatility . . . the big plus that Inco-Rod "A"* electrode alone can give you. It welds *most* dissimilar alloy combinations . . . ferritic and austenitic stainless steels, low alloy steels, mild steels, high nickel alloys, and other alloys.

Welds are strong, ductile, corrosion-resisting . . . of X-ray quality. And Inco-Rod "A" is *easy*-handling . . . with spray type arc, good slag removal.

**Write Inco's Mechanical Engineering Section** and ask about the alloys *you* want to weld. New, unpublished data on Inco-Rod "A" electrode may provide a ready answer to your problem.

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67 Wall Street New York 5, N. Y.

**INCO-ROD "A" electrode** is supplied in 14-inch lengths in four diameters, 3/32-, 1/8-, 5/32-, and 3/16-inch (the 3/32-inch is center grip)... packed in 5-lb. containers.

INCO **Welding Products**
Electrodes • Wires • Fluxes

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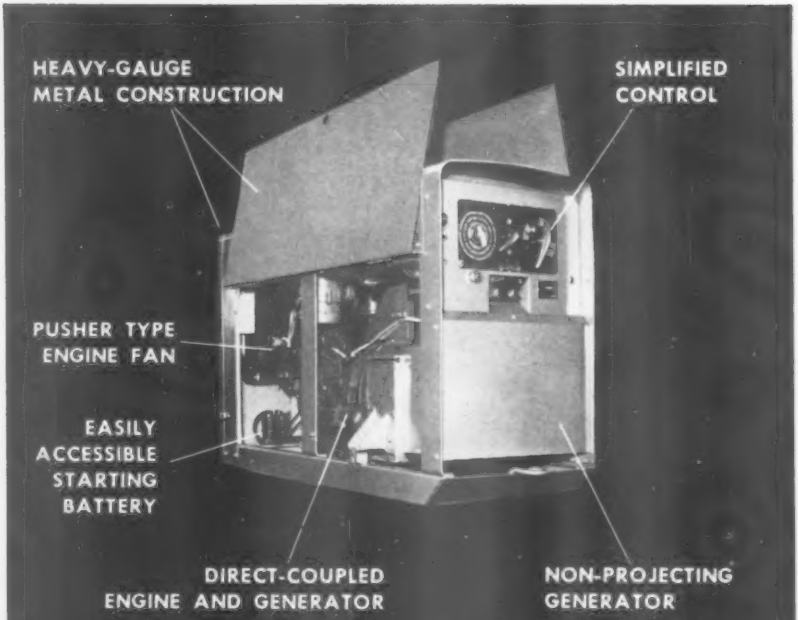


## Now—available in 200-, 300-, 400-amp models

**EASILY PRESET** Electrode Selector, Current Dial—Dual controls make current setting easier, more accurate—no guesswork.

**CONSTANT-PRESSURE** Brush Springs — Right pressure maintained for life of generator brushes without adjustments.

**PRELUBRICATED** Generator Bearings — Ball bearings prelubricated with sufficient grease for years of service—no relubrication.

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# How General Electric's NEW line of engine-driven welders helps you save with faster welding

**ADVANCED DESIGN ASSURES LESS "DOWNTIME," AND MINIMUM MAINTENANCE—FOR FASTER, LOWER-COST WELDING**

Nothing stretches out welding time more than unreliable equipment. It increases your maintenance costs and results in non-productive "downtime."

**TO REDUCE DELAYS,** General Electric's new line of engine-driven welders has been designed and field-tested for maximum durability and minimum maintenance—without sacrifice in performance. These new 200-, 300-, and 400-amp welders:

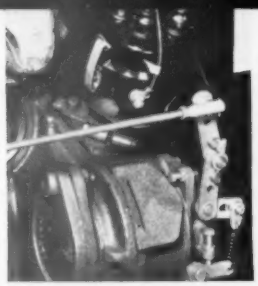
**SAVE YOU TIME**—Sturdy construction, the dependable Hercules engine, new-design generator, and simplified control all combine to give you steady output, longer operating time between overhauls, and reduced maintenance.

**SAVE YOU MONEY**—General Electric engine-driven welders begin saving you money the first day on the job. For example, the deep-sump crankcase provides complete lubrication to all moving engine parts—up to a 15-degree tilt in any direction. This helps to reduce costly breakdowns. Additional G-E advantages are described below.

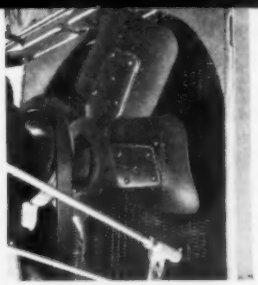
**FOR MORE INFORMATION** contact your nearby General Electric Welding Distributor (listed in the yellow pages of your telephone book) or write Section 714-5E, General Electric Company, Schenectady 5, N. Y.

*Progress Is Our Most Important Product*

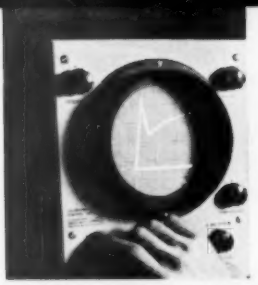
**GENERAL ELECTRIC**



**DEPENDABLE** Geared Governor—Gear-driven governor maintains close speed regulation for best welding, without lubrication.



**PUSHER-TYPE** Engine Fan—Large diameter pusher-type fan circulates ample cooling air for engine and generator—no vapor-lock.



**CONTROLLED CURRENT PEAKS**—Current peaks are controlled. Arc can be crowded with no time-consuming "stumbling" or "freezing."

| | | | |
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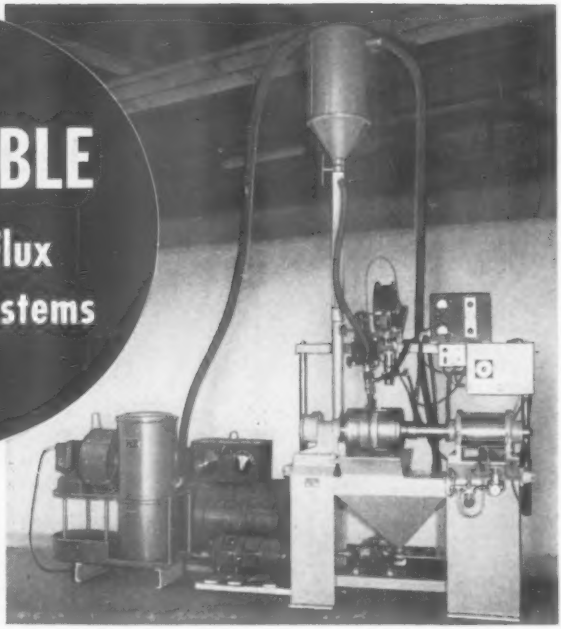
# INVINCIBLE

## Welding Flux Recovery Systems



This compact set-up includes a primary separator tank and an Invincible Model 460 unit.

## Pay for themselves . . . with interest!

**If you do submerged arc welding, consider these benefits:**

**1.** Invincibles save valuable flux by recovering **all** unfused flux from the work, removing slag or fused particles, and returning the unfused flux to the hopper of the welder. Both manual and continuous flow systems are available.

**2.** Invincibles save costly man-hours because they are more efficient than manual methods.

**3.** Invincibles also save money by removing all fine dust (flux flour), thus speeding production and reducing welding rejects.

These Invincible advantages can be applied to your job, regardless of its size. Let us send you our **Free Folder** on Flux Recovery.

**INVINCIBLE VACUUM CLEANER MFG. CO.**
DOVER, OHIO

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**SEE A "UNIVERSAL" IN OPERATION DURING THE METAL SHOW OCTOBER 8-12**

Transportation will be furnished for daily visitations to our Bedford plant.

**CALL BEDFORD 2-2500 FOR DETAILS.**

Ask for Mr. White or Mr. Baer.

# THE LEWIS "UNIVERSAL" AUTOMATIC WELDING FIXTURE

This versatile automatic welding head manipulator makes precision longitudinal and transverse welds, both internal and external, with robot-like consistency and machine tool accuracy. Its speed and ease of alignment greatly reduce set-up times and overall costs for large intricate weldments.

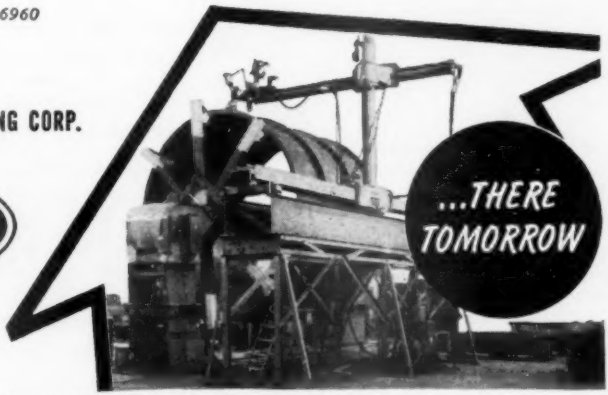
Easily moved by overhead crane, the LEWIS "Universal" can be used for repetitive production or special set-ups. Both track-type and pedestal-type models are available in a range of sizes.

*Write today for Bulletin 6960 for details*

**THE LEWIS WELDING & ENGINEERING CORP.**
Welding Division

LEWIS

70 Interstate Street
Bedford, Ohio

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# Welding Output Increased

*on*

*Western Electric Coin Box Production*

Suppose you needed to spot-weld sheet steel to steel forgings, in hard-to-reach locations. Western Electric's plant at Indianapolis had this problem on telephone coin boxes. Custom-designed electrodes and holders had seemed the way to do the job.

But, since using a standard Mallory heavy-duty offset holder and Mallory bent tips, their welding costs have been reduced and production rate has been increased.

**Output increased.** The number of parts welded per shift has been increased significantly. Reason: less tip dressing, less setup time loss, cooler operation and minimum respotting.

**Longer electrode life.** Replacement rate is now less. Reason: better cooling of electrodes . . . all the way to the tip.

**Less down time.** Re-dressing is now needed only once per shift.

Chances are that you, too, can make substantial savings in resistance welding production, by using Mallory electrodes, holders, seam welding wheels, dies, castings and forgings... and by taking advantage of Mallory engineering service in applying these products effectively to your problem. See your local Mallory welding distributor for prompt service, and write to us for our resistance welding catalog.

*In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry St., Toronto 15, Ontario*

***Expect more... Get more from***

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**Serving Industry with These Products:**

**Electromechanical**—Resistors • Switches • Tuning Devices • Vibrators • **Electrochemical**—Capacitors Rectifiers • Mercury Batteries • **Metallurgical**—Contacts • Special Metals • Welding Materials

**For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio**

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# COST CUTTING IDEAS for

## Production and Maintenance Welding

The constantly expanding use of welding, brazing and cutting for production, maintenance and in-plant fabrication has made these processes factors of major importance in our national economy. The cost cutting ideas which follow, necessarily limited in number, indicate the tremendous potential for savings made possible by those processes.

To those industries which are "knee deep" in welding and to those which are not normally associated with the various welding processes, we offer this section with the hope that it will present to them economical solutions to their specific problems.

**THE EDITORS**

## COST CUTTING IDEA 1

### Positioned Welding Saves Allis-Chalmers $87 a Day

Made possible by use of a 6,000 lb. capacity welding positioner, downhand welding of 3,000 lb. drive housings saves Allis-Chalmers Mfg. Co. $8.37 a day in labor and burden costs. Production was increased 100 percent.

Positioned welding holds operator fatigue and waste motion to a minimum and practically eliminates rehandling.

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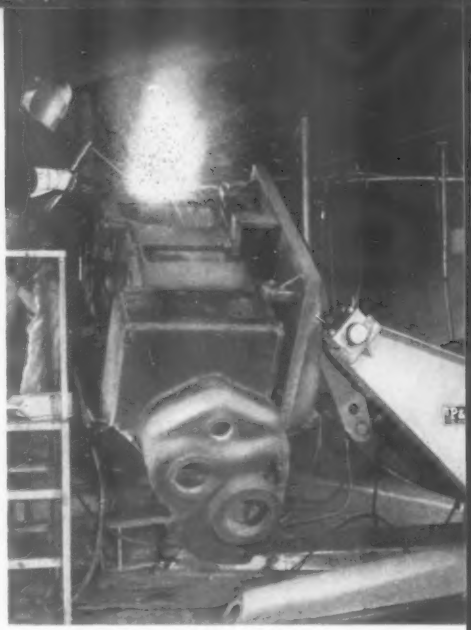

## COST CUTTING IDEA 2

### Submerged Arc Machines Cut Welding Time 70%

Used by Alliance Machine Co., Alliance, Ohio, to fabricate large girders, these two machines have cut welding time 70 percent. They weld two web-to-cover plate joints at once with girder positioned flat on its side.

Units are self-propelled and ride on girder web guided by flange edge. Operation is completely automatic.

Units have also effected savings in handling and weld cleaning time.

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## COST CUTTING IDEA 3

### American Motors Saves $600,000 by Metallizing

Salvaging imperfect crankshafts at the rate of 50 a day, 5 days a week, 50 weeks a year, has saved American Motors Corp. $600,000 since 1950.

Metallizing is done in four steps. Area to be built up is cleaned with emery cloth and portions adjacent to work area masked off. Crankshafts are then built up by application of wire which is essentially pure molybdenum. Finish grinding completes operation. Finished thicknesses vary from .010 to .040-inches.

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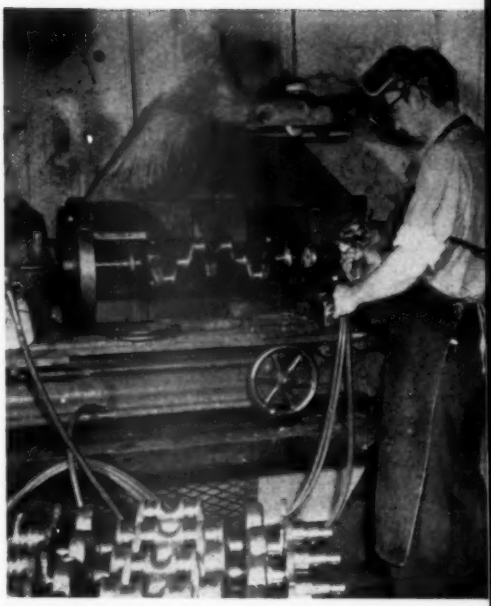

## COST CUTTING IDEA 4

### "On-the-Job" Surfacing Rebuilds Cutter Heads

Cutter heads used in sand sucking operations must be built up once a week because of terrific abrasive wear. On-the-spot surfacing made possible by use of 250 amp gas-driven welder is done in less man hours than if new cutter heads were installed. Need for expensive replacement parts is eliminated.

Cutter head teeth which bear brunt of wear are built up with 5/32 and 3/16-inch diameter surfacing electrodes using 130 to 200 amps.

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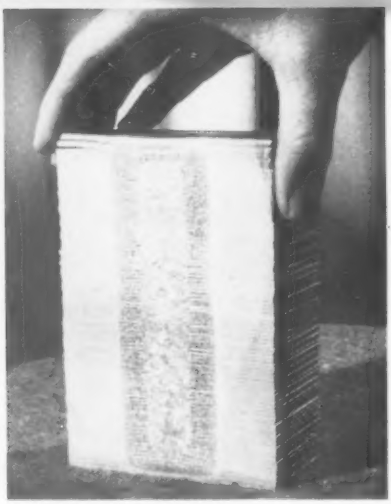

## COST CUTTING IDEA 5

### Spot Welding Salvages Titanium Scrap

Spot welding is used by Glenn L. Martin Co. to salvage scrap sheet titanium. Welding is done in liquid coolant to prevent oxidation and eliminate metal expulsion and warpage.

Solid titanium stack (right) was formed by spot welding 89 titanium sheets. Weld nugget is at least as strong as parent metal and can be made into small aircraft parts, such as hardware.

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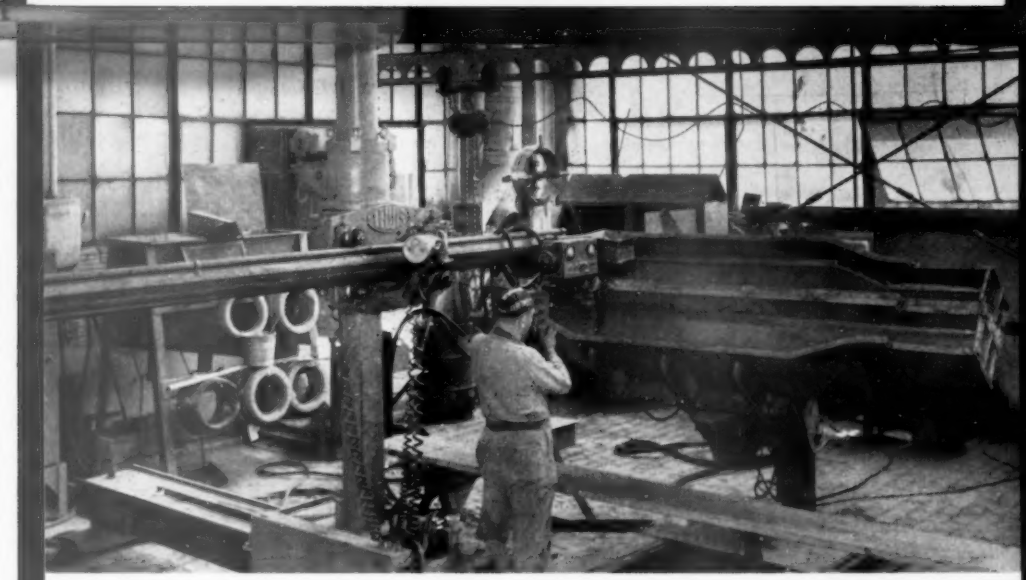
## COST CUTTING IDEA 6

### Oxy-Acetylene Flame Degreases Welded Tubing

The oxy-acetylene flame is used by Mechanical Handling Systems, Inc., Detroit, Mich., to help produce high quality welded square tubing. Oxy-acetylene flame positioned just in front of submerged arc head dries and degreases tubing prior to welding.

**Circle No. 6 on Reader Service Card.**



## COST CUTTING IDEA 7

### Automatic Welding Cuts Costs 75 Percent

Proper application of automatic submerged arc welding produces outstanding savings. Illustration shows automatic welding of typical machinery component using submerged arc head mounted on a universal head manipulator. Manipulator permits head movement in any direction for attaining selected joint and for driving head either laterally or transversely at any desired welding speed.

Components, in pairs, are mounted in a simple fixture on a positioner which tilts and rotates them for properly orienting head and weld joints. In this instance, where handling, fixturing and positioning are identical for either hand or automatic welding, combination of positioner, automatic head and versatile manipulator produce an astonishing reduction in welding costs as compared to manual welding.

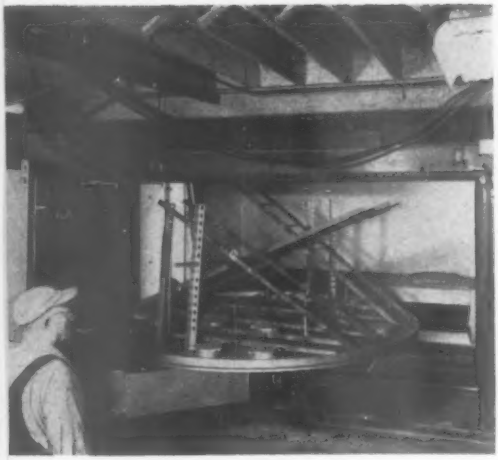
**Circle No. 7 on Reader Service Card.**

## COST CUTTING IDEA 8

### Welding Saves $10,000 Valve

A cast iron check valve which would have cost $10,000 to replace was recently repaired by Wyoma Welding Co., Lynn, Mass., at a cost of only $800. A huge crack down one side of the valve, along the flange and across to the other side was welded with mild steel electrodes developed for welding cast iron. Operators made eight passes along the break. Short welds were made to prevent overheating and further cracking.

**Circle No. 8 on Reader Service Card.**



## COST CUTTING IDEA 9

### Blast Clean Weldments Prior to Galvanizing

Airless abrasive blasting is being used to clean weldments prior to galvanizing at South Milwaukee plant of Line-Material Co. This cleaning process has made it possible for company to eliminate pickling in many instances.

Blast cleaning now makes it possible to use fluxed welding rods instead of bare ones. This results in better appearing welds, easier welding and reduced operator training time. Bare rods were used previously because no solution could be found to remove flux in acid pickling.

Blast cleaning also produces a matted surface for strong bonding, and makes it possible to detect defective welds prior to galvanization.

**Circle No. 9 on Reader Service Card.**

## COST CUTTING IDEA 10

### Apply New Hose Clamps in 25% Less Time

A new type of hose clamp used on portable welding guns made by Aro Machines A Souder, Paris, France, can be affixed in three seconds and is said to save about 25 percent of application time required with other types of clamps.

Essentially, clamps are round one-piece band-type units with U-shaped folds or lugs. Device is merely slipped on hose or part and crimped in place by squeezing parallel sides of lugs together to tightness desired using ordinary pliers or pincers.

**Circle No. 10 on Reader Service Card.**

## COST CUTTING IDEA 11

### Indexing Set-Up Brazes 300 Assemblies an Hour

To speed silver brazing of a U-shaped length of steel tubing to a stamped oil pump filter cover, the new V-8 engine plant of Buick Motor Division, Flint, Mich., developed a faster set up whose major component is a simple indexing dial having nine stations.

### Preplace Silver Alloy Ring

Operator preplaces silver brazing alloy ring over one end of the tube, inserts it in hole in stamping and applies flux. Assembly is then placed in a dial recess.

Air cylinder and plunger index dial and move assemblies through brazing cycle which includes heating by two-flame-retention type gas burners and cleaning by stream of soluble oil.

Indexing occurs each 12 seconds and one piece is completed at each indexing, a total of 300 pieces an hour. This is much faster rate than for previous induction heating set-up. Since only one operator is needed as against two for earlier setup, labor cost is lower as are operating material and costs.

**Circle No. 11 on Reader Service Card.**

## COST CUTTING IDEA 12

### Magnetic Clamps Align Plate for Tacking

Steel plate and tank fabricators find recently introduced electro-magnetic plate clamps are excellent time savers. This operator uses such a clamp to line up ¼-inch plate for tacking. On a 30-foot weld from 35 to 50 minutes can be saved on this one operation.

Simply and ruggedly designed, clamps have a minimum of wearing parts.

**Circle No. 12 on Reader Service Card.**

# 18 Smooth, Uniform Braze Welds in 8 minutes Add Economy to Quality in Peabody Classroom Chairs

Braze welded frame of PTAR Tablet Armchair

Circle No. 54 on Reader Service Card.

Braze welded frames for Peabody school furniture—combination of chair and open-front table.

## *Anaconda-997 Low-Fuming Bronze Rods Make Well-Shaped Braze Welds, Essential for Eye Appeal and Extra Strength, Says Leading School Furniture Manufacturer—and Lower Production Costs too.*

The Peabody Seating Company, Inc., North Manchester, Ind., has been making quality school furniture since 1902. Well-shaped braze welds, they say, are essential to maintain this quality. And they have found that Anaconda-997 Low-Fuming Bronze Rods make this kind of joint, not only adding eye appeal but providing the extra strength needed in school furniture.

By depositing smooth-flowing and low-fuming weld metal, these rods promote faster, more uniform work and thereby reduce production costs. The 18 braze welds pictured are made in 8 minutes—an average of about ½ minute per joint.

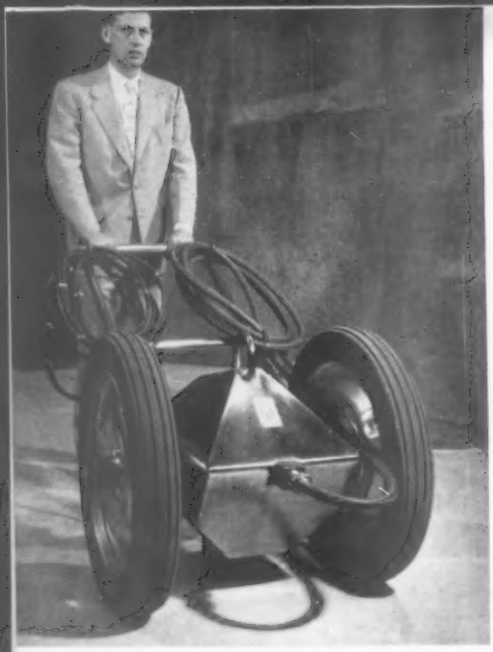
Anaconda-997 Low-Fuming Bronze is a superior welding rod used to join gray and malleable cast iron, steel and copper alloys by the oxyacetylene process. It is also used for repair welding, and to deposit bearing surfaces on steel and iron. You can get other Anaconda Copper Alloy Welding Rods for many different production and repair purposes. They are sold by distributors of welding equipment everywhere.

Anaconda distributors are also a good source of practical advice on welding problems. Purity Cylinder Gases, Grand Rapids, Mich., and Warsaw, Ind., furnish Peabody with Anaconda-997 Rods. For additional information write for Publication B-13. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 55126

**ANACONDA®**

**WELDING RODS**

Circle No. 54 on Reader Service Card.



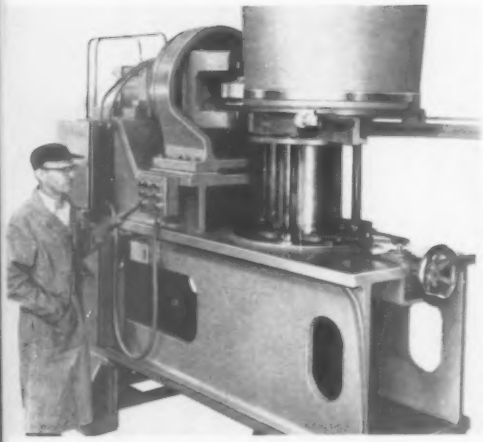
## COST CUTTING IDEA 13

### Portable Unit Speeds Gamma Radiography

One of the most powerful isotope radiography machines ever developed for portable field work is being used by Newport News Shipbuilding and Drydock Co. to detect flaws in welded joints.

Employing radiation from a 50 curie cobalt-60 source, low-cost portable unit it can penetrate very heavy sections of steel, lead and other materials. Unit is completely self-contained, requires no power supply and can be wheeled readily by one man to any in-plant location or taken outside for field work.

**Circle No. 13 on Reader Service Card.**



## COST CUTTING IDEA 14

### Roll Welds to Size

A weld rolling machine used by a Midwest auto maker cold rolls circumferential angular welds joining two cylindrical stainless steel parts. One part is a machined forging, the other a coiled and welded sheet metal section.

Thickness at weld on sheet metal part was .055". Forged part was machined on a taper to get same thickness at welding point. Parts were flush on I.D. with excess weld protruding. On O.D. of weld there was buildup of excess weld on an angle. Protrusion of weld on I.D. was rolled to parent metal as well as that on weld on angled O.D. (Total build up was 1/32-inch per side.)

**Circle No. 14 on Reader Service Card.**

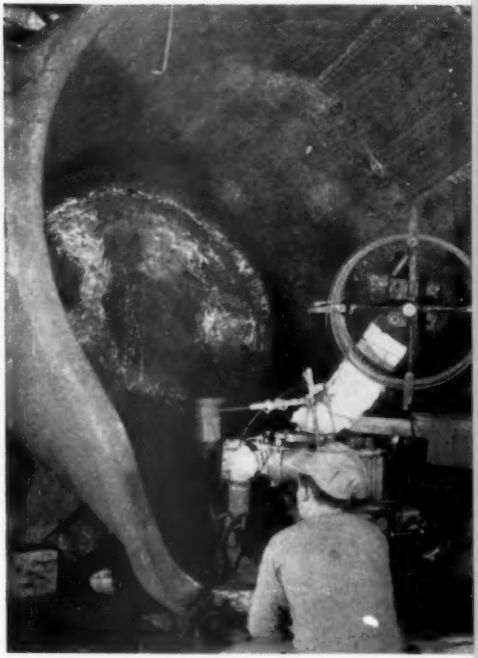
## COST CUTTING IDEA 15

### Submerged Arc Surfacing Reduces Erosion

A high chromium alloy rod applied by mechanized submerged arc equipment to bottom and spouts of this cast steel ladle increases service life by as much as 300 percent. Ladle is used in pouring of molten copper.

Facing speed averages seven ipm. Manual metallic arc equipment and 14-inch coated electrodes are used to face contours around the spouts.

**Circle No. 15 on Reader Service Card.**



## COST CUTTING IDEA 16

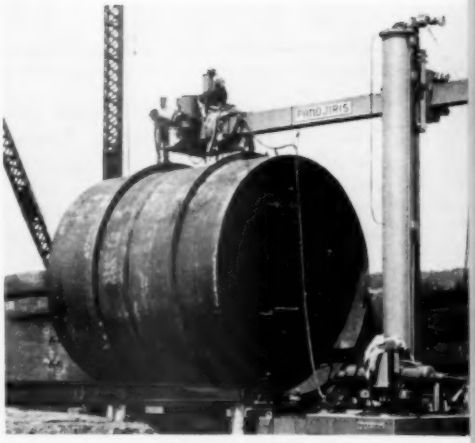
### Automatic Field Welding

A welding head manipulator and power turning rolls converted an open field into an efficient welding shop for Walsh Holyoke Fabricators.

A recent job called for about 3,500 feet of automatic submerged arc welding of pen stocks, ranging from 16½ to 19½-feet, with plate thickness from ⅝ to 15/16-inches.

Manipulator positions welding head, flux system and operator over pen stocks which are rotated by turning rolls mounted on self-propelled car. Welding speed averaged 20 fpm. Welds were made in two passes, one inside and another outside.

**Circle No. 16 on Reader Service Card.**



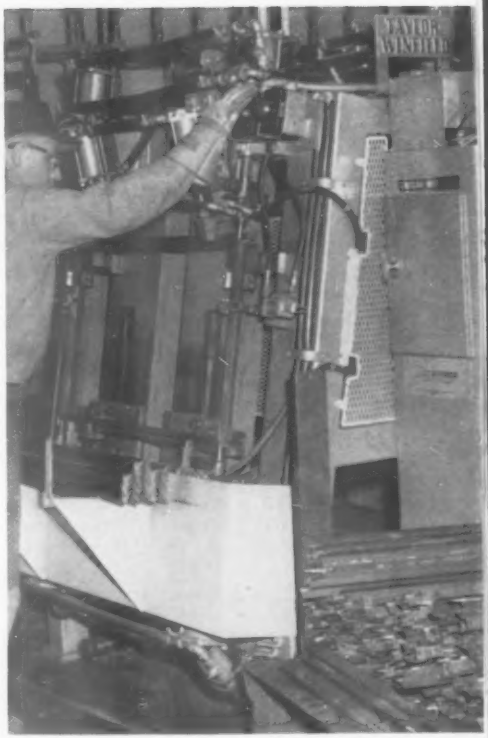
## COST CUTTING IDEA 17

### Hot Upsetting Welders Boost Production 40%

Use of new hot-upsetting welders on casement windows made by U.S. Gypsum Co., Warren, Ohio, has increased production rates by 40 percent. In addition, unit labor costs are down 50 percent, and employee morale has improved. Air hammers were formerly used to cold head weld section, clinching frame parts together. This operation was extremely noisy and tiring.

Because of uniform high quality of hot upset joints an inspector is no longer needed at this assembly step.

**Circle No. 17 on Reader Service Card.**



## COST CUTTING IDEA 18

### Manual Submerged Arc Speeds Casting Repair

Four operators — two on day shift, two working nights — formerly repaired steel castings by manual arc welding at Lectromelt Casting Co., Barberton, O. Now, semi-automatic submerged arc welding makes it possible for one man to handle same amount of work on day shift. About 60 pounds of weld metal are deposited in five hours. Castings require chipping out and welding up of sand holes, cracks and shrink holes.

**Circle No. 18 on Reader Service Card.**

## COST CUTTING IDEA 19

### Save Grinding Time on Welded Broach Base

Substantial savings in grinding time and costs were realized by Framingham Welding & Engrg. Corp. which used raised hub disc-wheels to grind and finish a 17-ton all-welded broach base. Multiple passes of E6020 weld metal were deposited in deep butt joints. This was carried into a final reinforcing layer and finished by the grinding.

Speed and quality of finish was important because only 10 working days were allowed for production of the weldment. Structure was shipped sand-blasted and prime coated, ready for painting.

**Circle No. 19 on Reader Service Card.**

## COST CUTTING IDEA 20

### Cut 20% from Cost of Brazed Cutting Tools

Use of electronic-type induction heaters for brazing has resulted in lower costs and increased production for Lake Tool Division of Besly-Welles Corp. Heater enables firm to keep pace with scheduled monthly production of 35,000 carbide cutting tools. Direct savings have amounted to 20 percent in brazing costs and 20 percent in diamond wheel costs.

**Circle No. 20 on Reader Service Card.**

## COST CUTTING IDEA 21

### X-Ray 3000 Welds in One Week

A new 150 Kv X-ray unit is speeding seam inspection and cutting costs for Delta Tank Mfg. Co., Baton Rouge, La. Equipment is frequently used on a 24 hour a day schedule and because of short exposure time can X-ray 2500 to 3000 welds in one week.

Here, unit is set up to X-ray a longitudinal seam. Film is taped inside tank shown at extreme right.

**Circle No. 21 on Reader Service Card.**

## COST CUTTING IDEA 22

### Efficient Weld Grinding

Acme Iron & Steel Fabricators grind window area well gratings with a portable electric grinder which permits fast grinding or dressing of welds. Grinder has sheet metal wheel guard and is equipped with spring steel disc assembly that provides resilient locking for supporting abrasive discs.

**Circle No. 22 on Reader Service Card.**

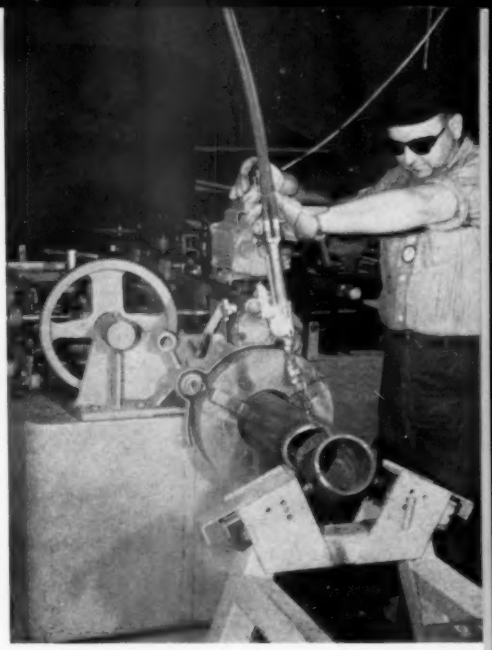
## COST CUTTING IDEA 23

### Cutters Reduce Pipe Fabrication Time 75%

Martin Company, Baltimore, Md., uses two mechanical pipe cutting machines for fabrication of tooling fixtures. Machines reduce pipe fabrication time 75 percent.

Units eliminate layout man and require no templates, cams or skilled operators. Machine settings are made in less than one minute and cutting time averages about three minutes. The clean, smooth, accurately beveled cut produced by oxy-acetylene flame reduces fit-up and welding time.

**Circle No. 23 on Reader Service Card.**



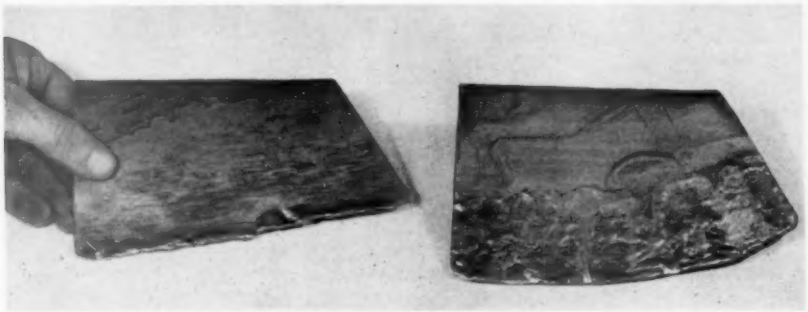
## COST CUTTING IDEA 24

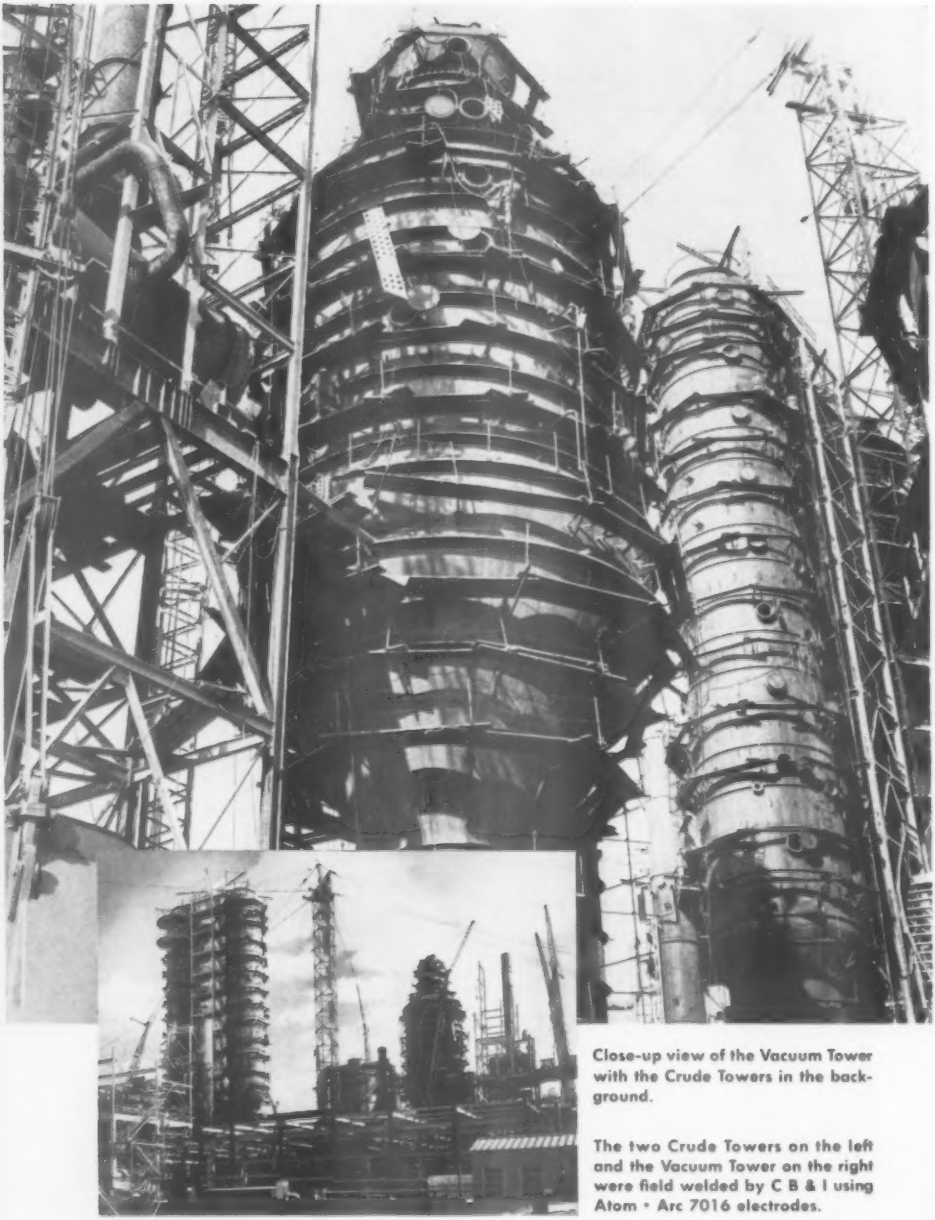
### Hard Facing Increases Service Life 15 Times

Useful service life of wheat-washer blades has been increased by using a fused hard facing alloy paste to protect working surfaces. Results of recent field tests show that protected parts (right) outlast 15 conventional mild steel blades (left). In addition, part costs are cut more than 90 percent, blade maintenance and machine down time are virtually eliminated and production is increased.

Chrome-boride alloy paste is brushed on. After drying, it is fused to parent metal by oxy-acetylene flame.

**Circle No. 24 on Reader Service Card.**





Close-up view of the Vacuum Tower with the Crude Towers in the background.

The two Crude Towers on the left and the Vacuum Tower on the right were field welded by C B & I using Atom • Arc 7016 electrodes.

**Circle No. 51 on Reader Service Card.**

# Welded with ATOM-ARC 7016

## CB&I reports more than 1 1/4 miles of field welds with less than 1/5 of 1% of X-rayed welds chipped and re-welded!

Chicago Bridge & Iron Company, one of this country's leading builders of tanks and processing structures, used Atom • Arc 7016 electrodes on this field erection job at the Sinclair Refinery in Marcus Hook, Pennsylvania. Their report on the building of this 138-foot Vacuum Tower and the two 176-foot Crude Towers makes amazing reading. For example, on the Vacuum Tower there were 2500 feet of field welds with only 8 inches of X-rayed welds that had to be chipped out and re-welded.

A summary report shows that there were 649 X-rays made on the job. 626 were satisfactory, 23 showed defects of one kind or another but only 15 were defects in field welding. A total of 6720 feet of welds (over 1 1/4 miles) were made with Atom • Arc 7016 electrodes and only 12 feet of X-rayed welds had to be chipped out and re-welded (less than 1/5 of 1%)!

All stainless clad sections in these towers were welded with Arcaloy 309 Stainless Steel Electrodes.

Quality workmanship is the paramount consideration at Chicago Bridge & Iron. Their report on this Sinclair job is enough to indicate that they get this high quality with Atom • Arc electrodes.

You'll want "Atom-Arc quality" on your jobs too. Contact your Alloy Rods Company distributor or write for informative Data Sheets.

Hortonspheroid* Storage Tank at Sinclair site, majority welded completely with Atom • Arc electrodes.
*Chicago Bridge & Iron Co.

Alloy Rods Co.

General Offices and Plant
York 2, Pennsylvania
Pacific Coast Sales Offices and Plant
El Segundo, California

no finer electrodes made...anywhere

Circle No. 51 on Reader Service Card.

## COST CUTTING IDEA 25

### Semi-Automatic Inert Arc Speeds Pipe Fabrication

Consumable electrode inert arc welding is being used by Gate City Steel, Inc., Boise, Idaho, to reduce amount of time spent in pipeline fabrication. Company has the job of producing almost a third of a mile of 6-foot pipe for a nearby pumping station discharge line.

Pipe is being delivered to site in 40-foot section. Each is made up of 4 10-foot sections which are rolled from steel plate. Circumferential welds on outside of sections formerly took as much as two hours with manual arc welding. Welds are now made in seven minutes using semi-automatic equipment. This is a saving in time of nearly 94 percent.

As with former method, 10-foot sections are joined by manual welding inside. Inside weld also serves as back-up for outside weld.

**Circle No. 25 on Reader Service Card.**

## COST CUTTING IDEA 26

### Flux Reclaiming Unit Saves $40 a Day

Flux reclaiming units with vibrating screens are used by a large automotive plant to reclaim submerged arc welding fluxes. This saves the company about $40 per day.

As welding progresses, fused flux, scrap, welding wire stubs and spilled fluxed feed into the reclaiming unit. Spilled and reuseable flux is screened and recycled to flux feeder hopper. Other material is side-discharged to a scrap or reclaim box.

**Circle No. 26 on Reader Service Card.**

## COST CUTTING IDEA 27

### Ten-in-One Resistance Welding

This highly automated grouping of 10 resistance welding machines operates simultaneously on 10 separate parts. Machines locate and weld connecting fittings and bushings to upper shells refrigerator. One operator loads and unloads shells. All other parts are automatically selected and placed in welding position from hopper feeds and other types of automatic loaders.

**Circle No. 27 on Reader Service Card.**

## COST CUTTING IDEA 28

### Save $15.50 per Unit in Hammer Reclaiming

Hammers used in secondary crushing operations in a lime rock reduction plant used to be worn to destruction and discarded. Now, they are resurfaced at a cost of $9.50 each as opposed to new hammer cost of $25.00.

Hammers are fitted with copper form to establish shape and size. They are rebuilt with nickel-manganese alloy and impact faces capped with high carbon-high chrome alloy. Application is made by running wires open arc through a magnetic flux welder.

**Circle No. 28 on Reader Service Card.**

## COST CUTTING IDEA 29

### Automatic Aluminum Brazing

Automatic brazing of all-aluminum cores for automobile air conditioners on a high speed 8-station machine permits one operator to produce 50 completed assemblies per hour (both end brazed) at a fuel cost of ½ cent each. Hand torch brazing previously used required 8 to 10 men for equivalent production.

**Circle No. 29 on Reader Service Card.**

## COST CUTTING IDEA 30

### End Welded Studs Double Production

End welded studs, which serve as teeth on cylinders in corn shelling machines made by C. O. Bartlett & Snow Co., have helped increase machine output by as much as 200 percent. Studs are end welded at rate of one every five minutes on this special automatic positioning machine, which rotates cylinder after a stud has been welded and also advances stud welding production unit along the cylinder.

Before redesign, square upset rivets had been used for 50 years.

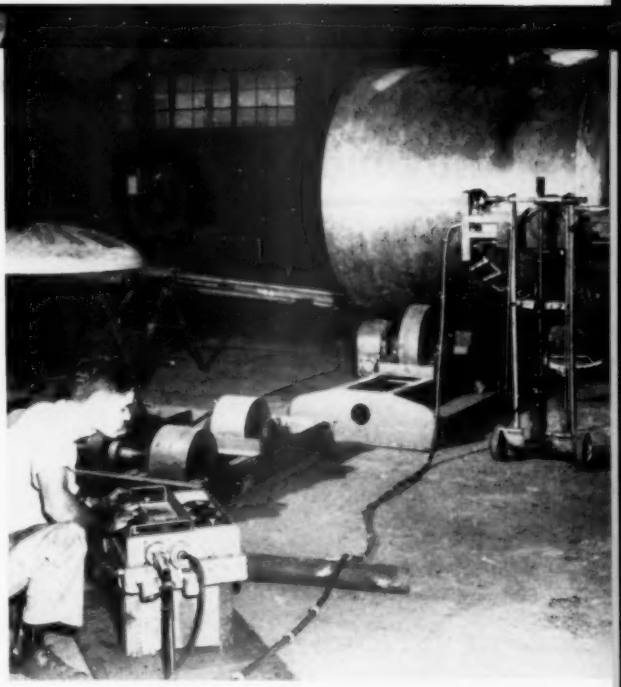
**Circle No. 30 on Reader Service Card.**

## COST CUTTING IDEA 31

### X-Ray Headseam in Three Hours with 18 Shots

Butt welded headseam of a 6-foot diameter pressure vessel is X-rayed by McJunkin Corp., Charleston, W. Va. in three hours with 18 shots. Unit is mounted on a cart for easy handling in plant or field.

**Circle No. 31 on Reader Service Card.**

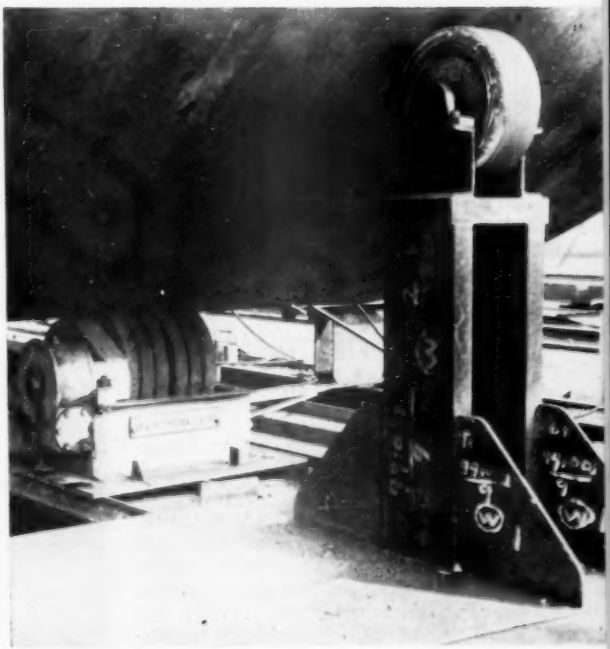


## COST CUTTING IDEA 32

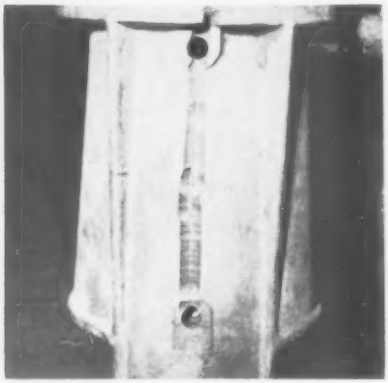
### Turning Rolls Speed Welding

Welding of twin 300-foot tunnel sections is speeded by use of turning rolls. Sections — 75-feet wide and 35-feet high—are positioned horizontally on a series of turning rolls and rotated in any welding position by push of a button.

**Circle No. 32 on Reader Service Card.**



## COST CUTTING IDEA 33



### Welded Repair of Casting Eliminates $70,000 Shutdown

Welded repair of cracked water jacket casting of a butane reciprocating pump recently saved a large oil refinery $1200 on the cost of new castings and prevented a 17-week shutdown which would have cost $70,000.

Cracks were first drilled at ends to prevent spreading. Then gray iron castings were slowly preheated for 1½ hours to 500°F and wrapped in an asbestos blanket to maintain heat during welding.

Welding was done with ⅛-inch diameter nickel-iron electrode. Each pass was well peened.

No postheat was required; castings were cooled slowly in powdered lime.

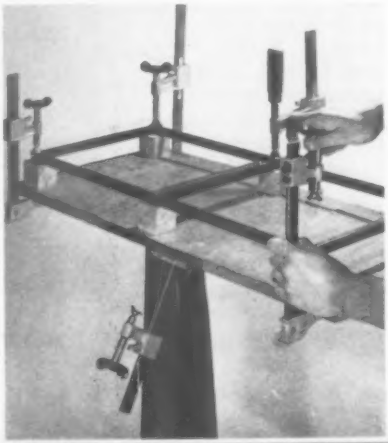
**Circle No. 33 on Reader Service Card.**

## COST CUTTING IDEA 34

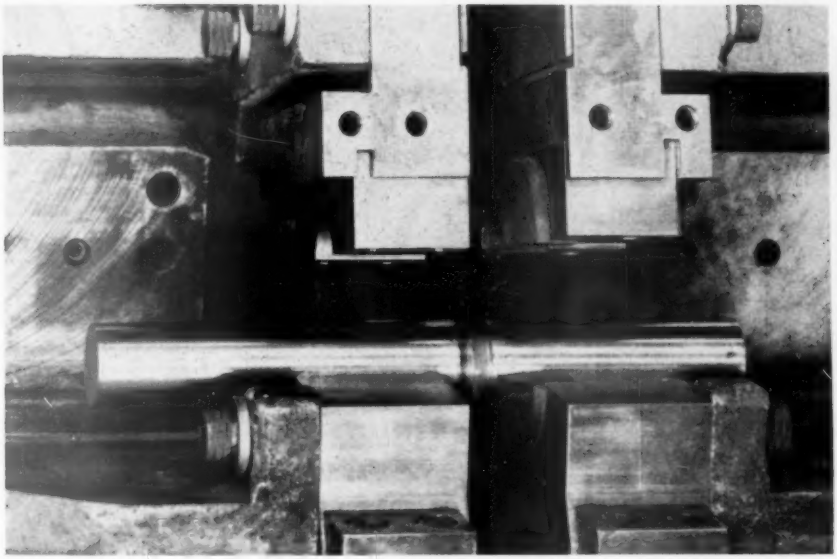
### Hinged Clamps Save Time

Hinged clamps reduce time and cost of production welding in jigs and fixtures. In repetitive jobs, clamps are mounted as part of holding fixture; on "job" work they are mounted on work table, ready to be swung into position by one hand. Special steel tracks make clamps adjustable sideways along length of track installed.

**Circle No. 34 on Reader Service Card.**



## COST CUTTING IDEA 35



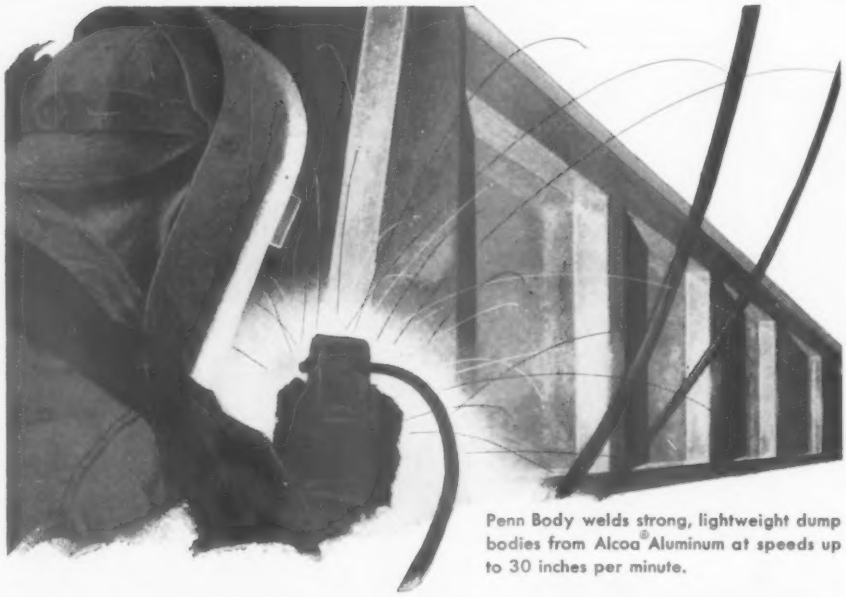
### Flash Welder Trims Flash As It Welds

A newly developed flash welder trims flash extrusion as it makes the weld. Previously, removing upset material and flash extrusion required a separate flash trimming operation with attendant labor and equipment expense. When not removed by a special machine, flash trimming involved slow and costly machining and chiseling operations.

The new welder will handle carbon steel from mild to 1.00 carbon, high speed steel, high alloy and stainless steel. It will weld and trim all shapes normally encountered in flash welding including flats, squares, rectangles, rounds and most irregular or extruded shapes. It delivers product ready for use and in most cases no further post-weld cleanup is necessary. When a highly finished product is desired, weld area requires only same treatment as rest of the part.

Shearing action is an integral part of welding cycle and follows immediately after upset motion. Since time required for shearing is measured in cycles, there is no appreciable difference in production rates compared with conventional flash welding.

**Circle No. 35 on Reader Service Card.**



Penn Body welds strong, lightweight dump bodies from Alcoa® Aluminum at speeds up to 30 inches per minute.

# High-strength *aluminum* dump bodies welded fast by new process

For some time, dump truck operators have cast longing eyes at the light weight and high payloads that aluminum dump bodies would make possible. But nobody knew how to weld aluminum bodies strong enough or fast enough.

But recently two important things happened: the shielded arc, inert gas, consumable-electrode method was developed and improvements were made in Alcoa Alloy 5154. Used with the new welding techniques, alloy 5154 now provides a 25% increase in strength across welds and a 150% increase in ductility.

Speed is way up, too. Penn Body Division of Hockensmith Corporation, a leading dump body builder, butt-welds $\frac{3}{16}$ inch sheet at speeds up to 30 inches per minute, compared with 16 inches per minute for the tungsten arc process. Depending on conditions and equipment, speeds as high as 60 to 80 inches per minute are now possible.

Now, companies like Penn Body offer a complete line of dump bodies that weigh only half as much as steel but with equivalent, or better, stiffness and impact resistance.

To make the bodies, Penn Body first butt-welds the floor from two sheets of 5154 alloy. Cross bracing is then added by skip-welding extruded beams of 6061-T6 alloy. Longitudinal members are welded in position and the sides and front, press braked from 5154 sheets, are welded in place.

Alcoa is headquarters for fresh, exciting ideas on how to weld, braze or solder aluminum. Get in touch with us. Where? See information at right.

**Circle No. 53 on Reader Service Card.**

*Want technical help* in welding, brazing or soldering aluminum? Contact your Alcoa sales office, listed under "Aluminum" in the Yellow Pages of your phone book.

*For immediate delivery* of Alcoa welding products, call your Alcoa outlet listed below. He carries a complete range of alloys and sizes.

**ALABAMA**
Birmingham
Hinkle Supply Co.

**CALIFORNIA**
Los Angeles
Pacific Metals Company, Ltd.
San Francisco
Pacific Metals Company, Ltd.

**COLORADO**
Denver
Metal Goods Corp.

**CONNECTICUT**
Milford
Edgcomb Steel of New England, Inc.

**FLORIDA**
Jacksonville
Florida Metals, Inc.
Miami
Florida Metals, Inc.
Tampa
Florida Metals, Inc.

**GEORGIA**
Atlanta
J. M. Tull Metal & Supply Co., Inc.
Southern Oxygen Co.

**IDAHO**
Boise
Pacific Metal Co.

**ILLINOIS**
Chicago
Machinery & Welder Corp.
Steel Sales Corp.
Moline
Machinery & Welder Corp.

**KENTUCKY**
Louisville
Williams & Co., Inc.

**LOUISIANA**
New Orleans
Metal Goods Corp.

**MARYLAND**
Baltimore
Southern Oxygen Co.
Whitehead Metal Products Co., Inc.

**MASSACHUSETTS**
Cambridge
Whitehead Metal Products Co., Inc.

**MISSOURI**
Kansas City
Metal Goods Corp.
St. Louis
Metal Goods Corp.

**NEW HAMPSHIRE**
Nashua
Edgcomb Steel of New England, Inc.

**NEW JERSEY**
Camden
Southern Oxygen Co.
Harrison
Whitehead Metal Products Co., Inc.

**NEW YORK**
Albany
Eastern Metals Warehouse, Inc.
Buffalo
Whitehead Metal Products Co., Inc.
New York
Whitehead Metal Products Co., Inc.
Syracuse
Brace-Mueller-Huntley, Inc.
Whitehead Metal Products Co., Inc.

**NORTH CAROLINA**
Charlotte
Southern Oxygen Co.
Greensboro
Southern Oxygen Co.

**OHIO**
Cincinnati
Williams & Co., Inc.
Cleveland
Williams & Co., Inc.
Columbus
Williams & Co., Inc.
Toledo
Williams & Co., Inc.

**OKLAHOMA**
Tulsa
Metal Goods Corp.

**OREGON**
Portland
Pacific Metal Co.

**PENNSYLVANIA**
Philadelphia
Southern Oxygen Co.
Whitehead Metal Products Co., Inc.
Pittsburgh
Williams & Co., Inc.
York
Southern Oxygen Co.

**TENNESSEE**
Kingsport
Southern Oxygen Co.

**TEXAS**
Dallas
Metal Goods Corp.
Houston
Metal Goods Corp.

**UTAH**
Salt Lake City
Pacific Metals Company, Ltd.

**VIRGINIA**
Norfolk
Southern Oxygen Co.
Richmond
Southern Oxygen Co.

**WASHINGTON**
Seattle
Pacific Metal Co.

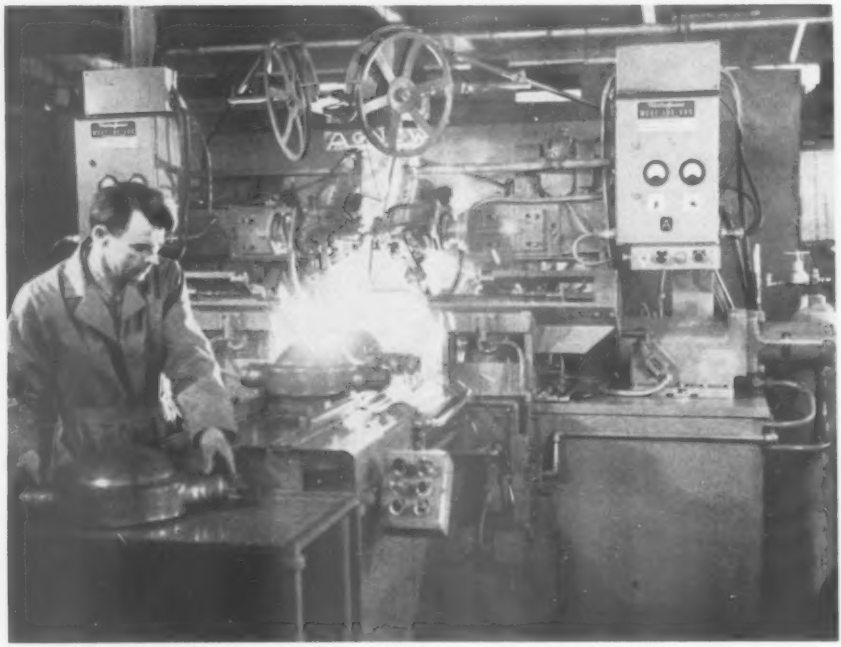
**WASHINGTON, D. C.**
Southern Oxygen Co.

**WISCONSIN**
Milwaukee
Machinery & Welder Corp.

***Your Guide to the Best in Aluminum Value***

**Circle No. 53 on Reader Service Card.**

## COST CUTTING IDEA 36



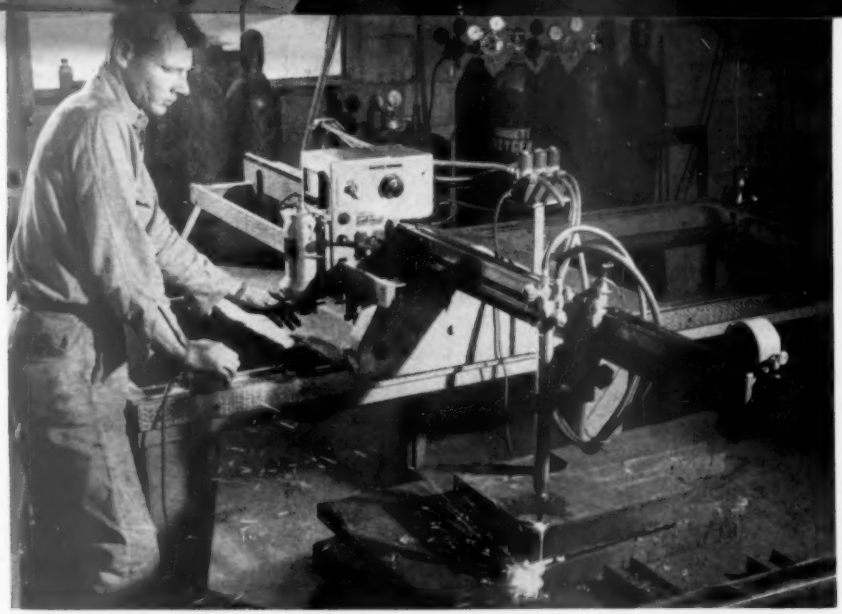
# Ford Cuts Costs With $CO_2$ Welding

Ford Motor Company engineers have put to use automatic consumable electrode inert arc welding with carbon dioxide gas shield. At present 71 such set ups are in use on the automated production line at Ford's new Sterling, Michigan, plant.

This welding set up is used for this highly automated production line because it provides welds strong enough to handle the increased torque of the new Fords. Besides giving stronger welds, process reduces materials costs from 12 to 25 percent and cuts welding time approximately 30 percent.

No abrasive flux is used. A jet of carbon dioxide gas completely floods the weld area, forcing all atmosphere away. This results in excellent, high density welds. Cost of flux material is eliminated and maintenance on machines and materials handling equipment is virtually done away with.

**Circle No. 36 on Reader Service Card.**



## COST CUTTING IDEA 37

### Versatile Flame Cutting

Versatile flame cutting machine is used by George D. Laughter Co., Dayton, Ohio, to cut simple or intricate shapes or strips. Machine has a cutting range from ¼-inch to 10-inches and can be used for manual or automatic cutting.

Although firm was established in 1954, Dayton Daily News was impressed enough to publish a feature article about it. Article cited company's use of automatic flame cutting to increase production and save time.

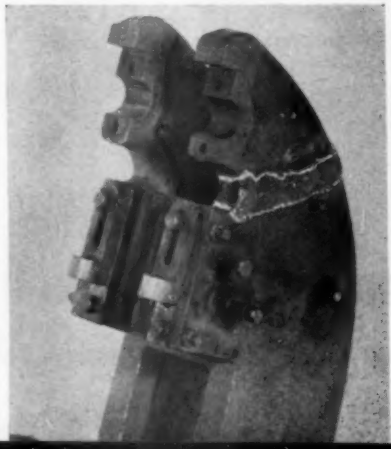
**Circle No. 37 on Reader Service Card.**

## COST CUTTING IDEA 38

### Welding Saves A Press

Only 1½ hours was needed to repair a crack in cast iron frame of this 4-ton punch press. Crack was gouged out and weld made without complete dismantling.

**Circle No. 38 on Reader Service Card.**

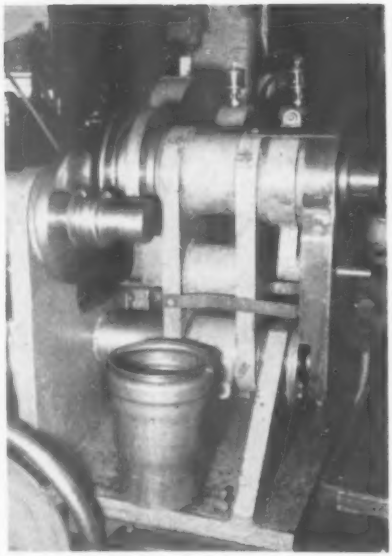


## COST CUTTING IDEA 39

### Bronze Overlay Increases Service Life 1000 Percent

Severe metal-to-metal wear, seizing, galling and product cracking in forming coupler and sprinkler outlets was plaguing Farmland Irrigation Co., Portland, Oregon. The deeply formed parts were crimped from 14 gauge steel tubing on high carbon steel rolls with a life expectancy of 7,000 pieces. Scrap losses and product reworking costs were excessive.

Solution was to overlay crimping rolls with a hard aluminum bronze overlay. Production has been increased to more than 70,000 pieces before reworking, scrap has been practically eliminated and reworking costs greatly reduced.



**Circle No. 39 on Reader Service Card.**

## COST CUTTING IDEA 40

### Inert Arc Saves $1485

A $1500 radial aircraft engine exhaust manifold was repaired recently by Aero Trades, Inc., Ronkonkoma, N.Y., at a cost of only $15.00. Made of .040-inch stainless steel, irregularly shaped manifold had a 3-inch hole which was repaired by manual tungsten arc inert gas shielded welding.

A 1/16-inch patch of stainless was first tack welded to assure perfect fit even when heated. It was then permanently welded, using argon gas to shield weld area from contamination by atmosphere.

No additional finishing was required after welding was completed. Bond was smooth and strong. Only 10 minutes was needed to perform entire job.

**Circle No. 40 on Reader Service Card.**

## COST CUTTING IDEA 41

### Motor Scooter Moves Welding Equipment

Welding operators can scoot to wherever they're needed on these new scooters which have been completely equipped with welding equipment. The new vehicles have speeded up the transporting of welding equipment to the job site at Granite City Steel Co., Granite City, Ill.

Dual wheel scooter can carry up to 2,000 lbs. and is equipped with oxygen and acetylene tanks, gauges, hoses, extension cables and a welding shield. All this, plus the operator, his shield and tools.

**Circle No. 41 on Reader Service Card.**

## COST CUTTING IDEA 42

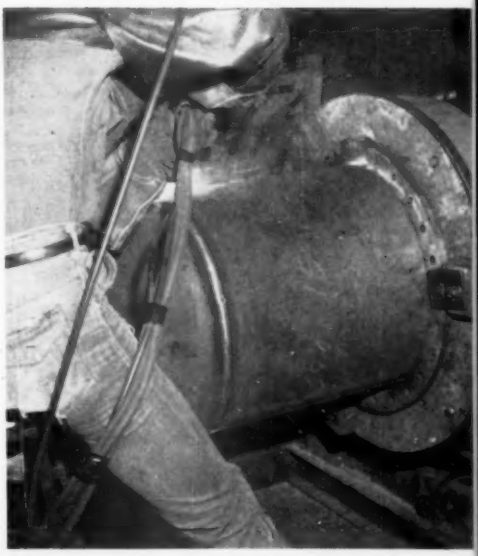
### Aluminum-Bronze Weldments

Warner Lewis Co., Tulsa, Okla., selected aluminum bronze for construction of filter separators because of its high strength, excellent corrosion resistance and good weldability. Aluminum bronze shells are rolled and tacked using tungsten gas inert arc process with bare aluminum bronze filler rod and thoriated tungsten electrodes.

Spooled aluminum bronze wire and consumable electrode inert arc welding process with argon gas shield is used to fabricate aluminum bronze.

Metal thickness ranges from $\frac{3}{16}$-inch for shell to $\frac{3}{4}$-inch for flange. Butt welding speeds average 20 ipm. No post weld treatment is required.

**Circle No. 42 on Reader Service Card.**



## COST CUTTING IDEA 43

### Flame Cutting Reduces Steel Costs $4.00 a Ton

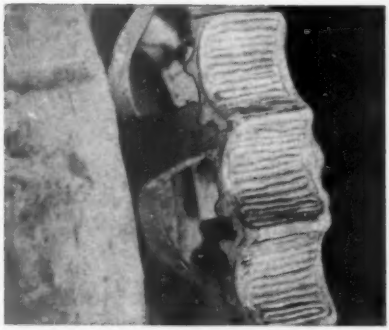
Use of machine flame cutting to reduce large scrap risers to charging box size has reduced steel costs about $4.00 per ton at Washington Iron Works, Seattle. Foundry is now able to reuse this material which would otherwise be wasted or sold to the steel producer and re-purchased in ingot form. Cast steel risers range in thickness from eight to 20-inches and are cut by a blowpipe mounted on a machine carriage.

Circle No. 43 on Reader Service Card.

## COST CUTTING IDEAS

Thanks are due to the following companies for their cooperation in making available the cost cutting ideas presented in this section:

| COMPANY | IDEA |
|---|---|
| Harnischfeger Corporation | 1 |
| Lincoln Electric Co. | 2 |
| Metallizing Engineering Co., Inc. | 3 |
| Hobart Bros. Company | 4 |
| Martin Company | 5 |
| Mechanical Handling Systems, Inc. | 6 |
| Lewis Welding & Engrg. Corp. | 7 |
| General Electric Co. | 8 |
| Wheelabrator Corp. | 9 |
| Circle Clamp Corp. | 10 |
| Handy & Harman | 11 |
| Buck Mfg. Company | 12 |
| Budd Company | 13 |
| Grotnes Machine Works, Inc. | 14 |
| Haynes Stellite Company | 15 |
| Pandjiris Weldment Co. | 16 |
| Taylor-Winfield Corp. | 17 |
| Lincoln Electric Co. | 18 |
| Bay State Abrasive Products Co. | 19 |
| General Electric Co. | 20 |
| North American Philips Co., Inc. | 21 |
| Milwaukee Electric Tool Corp. | 22 |
| Martin Company and Steffan Engineering | 23 |
| Wall Colmonoy Corp. | 24 |
| General Electric Co. | 25 |
| Simplicity Engineering Co. | 26 |
| National Electric Welding Machines Co. | 27 |
| Stoody Company | 28 |
| Selas Corp. | 29 |
| Nelson Stud Welding Division | 30 |
| Holger Andreasen, Inc. | 31 |
| Worthington Corp. | 32 |
| International Nickel Co., Inc. | 33 |
| Adjustable Clamp Co. | 34 |
| Thomson Electric Welder Co. | 35 |
| Westinghouse Electric Corp. | 36 |
| Burdett Oxygen Company | 37 |
| C. E. Phillips & Company | 38 |
| Ampco Metal, Inc. | 39 |
| Linde Air Products Co. | 40 |
| Granite City Steel Co. | 41 |
| Ampco Metal, Inc. | 42 |
| Linde Air Products Co. | 43 |



**INTERMITTENT PASS** used in hardsurfacing sprocket reduces rebuilding time and alleviates grinding by sand and mud.

**TRACTOR IDLER** shows herring-bone pattern created by intermittent pass. Grind and wear is reduced by this method.

# Welder Develops Hardsurfacing Shortcut Using RANITE and Intermittent Pass

IN LOOKING for a more economical and quicker way to hardsurface tractor sprockets and idlers, Welding Foreman Art Powell of the L. E. Webb Construction Co., Inc., Santa Maria, Calif., hit on the idea of applying Ranite metallic coated hardsurfacing materials with an intermittent pass. In using this technique Powell lays down alternating beads with a gap between.

After trying other methods, Powell found this combination required less rebuilding time and at the same time effected a substantial dollar saving on each job.

**ART POWELL,** welding foreman for L. E. Webb Construction Co., Inc., long-time Ranite user, combined Ranite with intermittent pass to reduce hardsurfacing time.

Tractors of the Webb Construction Co. operate in both loose sand and mud with parts subject to continual heavy abrasion. When an intermittent pass is used on sprockets and idlers, resulting gaps formed between beads provide escape channels for the sand and mud, reducing grind and wear.

Although the Webb Construction Co. has been a Ranite user for more than two years, this is the first time Ranite was used for tractor maintenance and applied with an intermittent pass. Both Ranite "A" 3/16 and "B" 3/16 are being used for this purpose. Ranite was selected for its fast deposition rate, its resulting smooth weld bead and because it will not work harden.

Prior to shifting to Ranite, rollers were either sent out for rebuilding by automatic or were replaced with new ones. Actual savings now produced by using Ranite over automatic is $6 per roller with savings on sprockets and idlers totalling more than half previous costs. In addition, Webb Construction Co. has reduced actual hardsurfacing time by 50 per cent with the Ranite and intermittent pass combination.

Original parts used by them have a normal life expectancy of between 2000 and 3000 hours. Indications of Ranite hardsurfaced parts checked at 1000 hours of use are that the service span will be increased as much as three times.

Ranite, manufactured by Rankin Manufacturing Co., is the original metallic coated hardsurfacing rod in use throughout industry since 1938. It is made in several grades with a rod available to fit any hardsurfacing job. Toughness in proper relation to hardness is the answer to any wear problem and Ranite is alloyed on this principle with each grade being proportioned to give maximum wear for the job it is designed to do.

Cut your hardsurfacing time and costs now by shifting to Ranite. There's a Ranite rod for your application. For further information see your Ranite distributor or write to

**RANKIN MANUFACTURING CO.**
Dept. W-2-B, 616 South Marengo Ave.
Alhambra 2, Calif.

**Circle No. 133 on Reader Service Card.**

NEWSFRONTS

# Drilling

**How Higgins uses steel columns welded with A. O. Smith electrodes to eliminate the dangers and difficulties of erecting off-shore oil drilling platforms.**

**The A. O. Smith distributor**

**Sheldon Ritter, Sales Mgr. of Gulf Welding Equipment Co., is the A. O. Smith welding consultant who worked with Higgins. More than a salesman, he's a welding specialist, ready and eager to help with any welding problem.**

*Through research* ... *a better way*

**A.O.Smith**

CORPORATION

**WELDING PRODUCTS DIVISION**

Milwaukee 1, Wisconsin

International Division: Milwaukee 1, Wisconsin

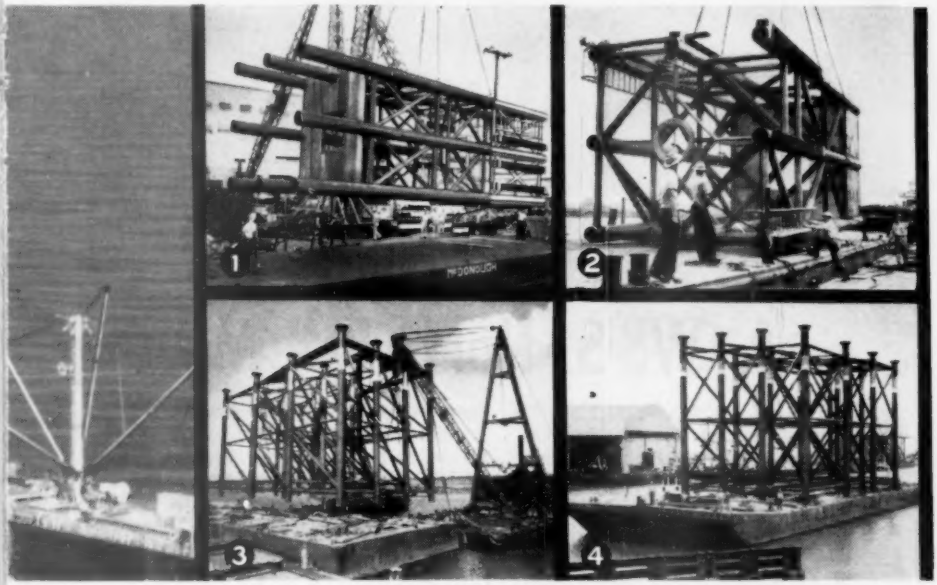
**Circle No. 141 on Reader Service Card.**

# rig goes to sea

Building a ship a day was child's play for Higgins, Inc. — compared to building offshore oil drilling platforms. Structures must have minimum bulk, be able to survive in winds of hurricane force. Yet, structures must be able to withstand thousands of tons of water slashing at their footings.

Today, Higgins builds one of these platforms in about 60 days. The amount of welding involved approaches the fantastic. To make these tough-service welds, they're using A. O. Smith SW-10 (E-6010) . . . SW-15 (E-6013) . . . and SW-44 (E-6024) electrodes and A. O. Smith welding machines.

Like Higgins, if you want welds you can depend on, it will pay you to insist on A. O. Smith electrodes. For reasons why, contact "your man from A. O. Smith."




To tap black gold beneath the sea, oil drilling rigs like this are located anywhere from a few hundred yards up to 150 miles offshore. Upon the strength of these structures rests the lives of scores of men, millions of dollars. What better testimonial for the dependability of welds made with A. O. Smith electrodes.

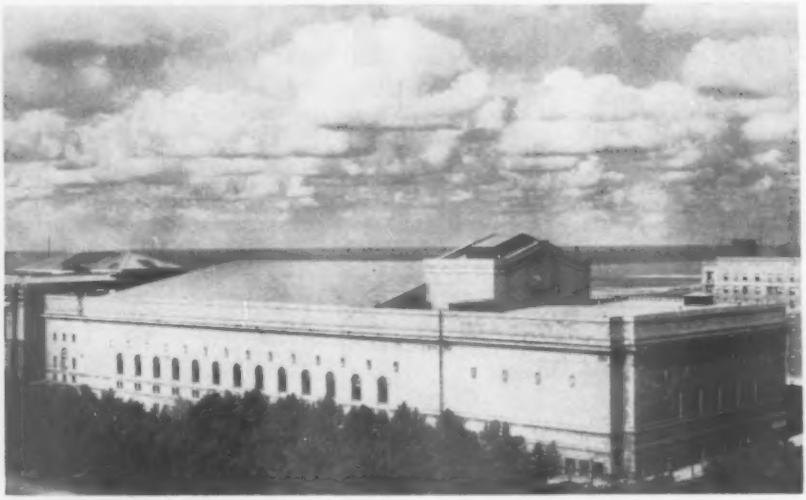
1 Platforms, fabricated on dry land, are begun by welding 10 to 12 foot sections into longer columns. Shiny sections at right are special treated sections of structure that resist corrosion at the splash zone.

2 A completed single well protector jacket being loaded for delivery to its offshore location.

3 Huge cranes, capable of handling 250-ton loads are used to load completed assemblies onto sea-going barge. The barge delivers them to the offshore drilling site and a ship's crane sets them in place.

4 Object of pre-fabricating assemblies and shipping them by barge, like this, is to cut production costs, also to minimize danger relative to length of time incompleted platform must survive.

**Circle No. 141 on Reader Service Card.**



**Scene of 1956 "Metal Show", Cleveland Public Auditorium provides more than 250,000 square feet of exhibit space.**

# A. W. S. Holds Fall Meeting

ALL phases of welding activity will be featured during the National Fall Meeting of the American Welding Society in Cleveland October 8-12. Some 57 papers on the latest trends, developments and uses of welding will be presented during 21 technical sessions.

Highpoint of important talks will be the delivery of the 1956 Adams Lecture by George E. Linnert, head of the welding research group in the Armco Steel Corp. Research Laboratories. Mr. Linnert will discuss the "Welding of Precipitation-Hardening Stainless Steels" during the Monday morning Honors Session.

The importance of this subject is borne out by the rapid increase in use of precipitation-hardening stainless steels in high-strength, corrosion-resisting products. Mr. Linnert's paper will provide valuable information on the welding and fabrication of these steels, their metallurgical characteristics, and heat treatment.

Other sessions will include papers on welding of structures and aircraft; weldability and research; inert arc welding; resistance welding; brazing and surfacing; welding of tubing, piping and pressure vessels; welding of titanium, aluminum, molybdenum and zirconium; cutting of metals and design and inspection.

Two specialized sessions are also planned to cover metallizing and shop management. The latter will be led by Lew Gilbert, executive editor, INDUSTRY & WELDING.

Other events scheduled are the

**Air view of downtown Cleveland shows Terminal Tower, Public Square, the Mall, Stadium and Public Auditorium.**

# in Cleveland, October 8-12

President's Reception, the National Dinner, two plant tours and a series of educational lectures.

The AWS Fall Meeting will be held in conjunction with the 38th National Metals Exposition where welding and cutting exhibits and demonstrations will be shown. Exposition will be held in Cleveland's Public Auditorium and Exhibition Hall with 350,000 square feet of exhibition space.

Concurrent with the Metal Show, the National Metal Congress will hold technical sessions in four headquarters hotels. Participants in the Congress, besides the American Welding Society, are the American Society for Metals (Hotel Statler), the Institute of Metals Division of the American Institute of Mining, Metallurgical and Petroleum Engineers (Hotel Carter) and Society for Non-Destructive Testing (Hotel Hollenden).

In addition, two other societies will conduct sessions concurrent with the Metal Congress. They are The Special Libraries Association, Metals Division and the Industrial Heating Equipment Association.

**HANDY SHOW GUIDE . . .** The next 6 pages contain complete information on the technical program for the A.W.S. Fall Meeting and welding exhibitors at National Metals Exposition. Take them with you to the show. They will help you get the most out of the time you spend at this important event.

## *Here's A Complete List of Welding Exhibitors At 1956 Metal Exposition—October 8-12*

### A

Acetogen Gas Company ..... 2656
Advance Glove Mfg. Company ..... 2803
Aeroprojects Incorporated ..... 2333
Ajax Electric Company ..... 1609
Allegheny Ludlum Steel Corp. ..... 451
American Brake Shoe Co. ..... 215
American Chain & Cable Co., Inc. ..... 1816
American Optical Co. ..... 1136
American Pullmax Co., Inc. ..... 2521
American Silver Co., Inc. ..... 930
Amperex Electronic Corp. ..... 2635
Arcweld Manufacturing Co. ..... 2302
Aro Spotwelder Division ..... 2733

### B

Babcock & Wilcox Company ..... 522
Balteau Electric Corporation ..... 2622
Banner Welder, Inc. ..... 2769
Binks Manufacturing Co. ..... 2755
Branson Ultrasonic Co. ..... 2145
Brennen, Bucci & Weber, Inc. ..... 1732
Brush Electronics Co. ..... 1726
Buck Manufacturing Co. ..... 2546
Budd Company ..... 1709

### C

Cam-Lok Division ..... 2520
Clementina Limited ..... 2673

### D

Delta Power Tool Division ..... 1916
deSanno & Son, Inc., A. P. ..... 1942
Detrex Corporation ..... 1907
Detroit Testing Machine Co. ..... 1806
Diversey Corporation ..... 1012

### E

Eastman Kodak Company ..... 1002
Easton Metal Powder Co. ..... 1703
Empire Products, Inc. ..... 2520

### F

Ferrotherm Company ..... 536

### G

Gas Appliances Service, Inc. ..... 2837
General Electric Co.,
Apparatus Sales Division ..... 305
General Electric Co.,
X-Ray Department ..... 1104
General Ultrasonics Co. ..... 2866
Gregory Industries, Inc. ..... 1930
Guthery Machine Tool Corporation ..... 2733

### H

Harris Calorific Co. ..... 223
Haynes Stellite Co. ..... 1608
Hobart Brothers Company ..... 2541

### I

Industrial Publishing Group ..... 801
Industry & Welding Magazine ..... 801
International Nickel Co., Inc. ..... 402, 408
Invincible Vacuum Cleaner Mfg. Co. ..... 2703

### J

Jergens Tool Specialty Co. ..... 2572
Jomac, Incorporated ..... 2715

### K

King Tester Corp. ..... 253
Kirkhof Mfg. Corporation ..... 2860

### WHAT TO SEE AT THE SHOW

**Exhibitors listed here will feature equipment, accessories and related products for use in arc welding, inert arc welding, oxy-acetylene welding, cutting and brazing and resistance welding.**
**If you were unable to attend the show and would like additional information about new developments on products exhibited, write the Editor, INDUSTRY & WELDING, 812 Huron Road, Cleveland 15, Ohio, mentioning the specific company in which you are interested.**

## L

Lepel High Frequency Laboratory, Inc. 2211
Lincoln Electric Co. 440
Lindberg Engineering Co. 431
Linde Air Products Co. 1608

## M

Magnaflux Corporation 231
Martindale Electric Co. 1212
Metal Removal Company 2033
Metallizing Company of America 506
Metallizing Engineering Co., Inc. 2233
Met-L-Chek Company 704
Minnesota Mining & Manufacturing Co. 2822

## N

National Carbon Co. 1608
National Torch Tip Co. 2632
Nelson Stud Welding Division 1930
North American Philips Co., Inc. 2635
Norton Company 2657

## O

Oakite Products, Inc. 941
Ohio Crankshaft Company 2212
Ohio Nut & Bolt Company 2760
Olsen Testing Machine Co. 1137
O'Neil-Irwin Mfg. Company 1410
Osborn Manufacturing Co. 2116

## P

Pangborn Corporation 1901
Pedrick Tool & Machine Co. 2456
Phoenix Products Co. 2567
Picker X-Ray Corporation 2557
Portomag, Inc. 2708

## R

Raytheon Mfg. Company 2848
Reid Avery Comany 2861
Riehle Testing Machines Division 241
Rockwell Mfg. Company 1916
Ryerson & Son, Inc., Joseph T. 405

## S

Sciaky Bros., Inc. 2206
Skil Corporation 2239
Sperry Products, Inc. 1428
Standard Electric Tool Co. 1047
Stanley Electric Tools Div. 1741
Steel City Testing Machines, Inc. 1324
Superior Pneumatic & Mfg., Inc. 2819

## T

Tempil Corporation 929
Thomson Electric Welder Co. 1751
Thor Power Tool Co. 2723
Titanium Alloys Mfg. Division 2111
Tocco Division 2212
Torit Manufacturing Co. 935
Turco Products, Inc. 2234

## U

Union Carbide & Carbon Corp. 1608
U. S. Rubber Co. 2823
United Wire & Supply Corp. 554
Uniworld Research Corp. of America 809

## V

Vacu-Blast Co., Inc. 2719
Vandersee Corporation 2408

## W

Wales-Strippit Corp. 2405
Wallace Supplies Mfg. Co. 2401
Wells Manufacturing Corp. 1912
Westinghouse Electric Corp. 1711
Wheelabrator Corporation 2850

## SHOW HOURS FOR 38TH METALS EXPOSITION

**October 8 (Monday)** ..... **12 noon to 10:30 p.m.**
**October 9 (Tuesday)** ..... **12 noon to 10:30 p.m.**
**October 10 (Wednesday)** ..... **12 noon to 10:30 p.m.**
**October 11 (Thursday)** ..... **10 a.m. to 6 p.m.**
**October 12 (Friday)** ..... **10 a.m. to 6 p.m.**

# Tentative Technical Program

# AWS National Fall Meeting

## Cleveland, Ohio

## October 8-12, 1956

### October 8, Monday Afternoon—Three Simultaneous Sessions

**1. STRUCTURES**

A. Behavior of Welded Built-Up Beams Under Repeated Loads by J. E. Stallmeyer, W. H. Munse and B. J. Goodal, University of Illinois

B. Welded Open-Web Expanded Beams by M. Altfillisch, and A. A. Toprac, University of Texas

C. Welded Reinforcement of Openings in Structural Steel Tension Members by R. A. Hechtman, and D. D. Vasarhelyi, University of Washington

**2. WELDABILITY AND RESEARCH**

A. Notch Toughness Characteristics of Submerged-Arc Weld Deposits by I. L. Stern, N. A. Kahn and H. Nagler, New York Naval Shipyard

B. Effect of Metallurgical Variables on Transition Behavior in Charpy Slow-Bend and Impact Tests by C. F. Hartbower, Watertown Arsenal Laboratories

C. Mild-Steel Weld-Metal Porosity by R. D. Stout, Lehigh University and J. T. Ballass, Electric Boat Division of General Dynamics Corporation

**3. INERT ARC WELDING**

A. Factors Affecting Melting Rate of Gas-Shielded Metal-Arc Welding by A. Lesnewich, Air Reduction Company, Inc.

B. Shielded Gases for Inert-Gas Welding by W. H. Helmbrecht and G. W. Oyler, Linde Air Products Company

C. Inert-Gas Metal-Arc Welding of High-Pressure Valves by F. R. Zacheus, Air Reduction Sales, Inc.

### October 9, Tuesday Morning—Three Simultaneous Sessions

**4. AIRCRAFT**

A. Design Requirements for Fusion Welding Titanium in Aircraft Applications by R. Meredith, North American Aviation

B. Fusion Welding of Magnesium Thorium Alloys by F. K. Lampson, Marquardt Aircraft

C. Weld Planishing Improves Production of Aircraft Parts by H. L. Meredith, Airline Welding and Engineering Company.

**5. WELDABILITY AND RESEARCH**

A. Brittle Fracture Initiation Tests by C. Mylonas and D. C. Drucker, Brown University

B. Brittle Fracture Propagation in Wide Steel Plates by W. J. Hall, R. J. Mosborg and V. J. McDonald, University of Illinois

C. The Effect of Microstructure on Notch Toughness — Part IV by J. C. Danko, R. D. Stout and J. H. Gross, Lehigh University

**6. DESIGN AND INSPECTION**

A. How Welding Can Further Bridge Building Progress by O. Blodgett, The Lincoln Electric Company

B. Industrial Radiography by Gamma Ray Projection From Radioactive Isotopes by C. M. Dick, Metal & Thermit Corporation

C. Greater Acceptance of Welding Through the Use of Inspection Methods by J. R. Harren, Magnaflux Corp.

## October 9, Tuesday Afternoon—Three Simultaneous Sessions

**7. INERT-ARC WELDING**

A. Selection of Proper Inert-Gas-Shielded Arc-Welding Process by C. J. Sullivan and I. D. Holster, Jr., Air Reduction Sales Company

B. Consumable-Electrode Inert-Gas Welding With Small-Diameter Wires by K. E. Richter and J. F. M. Essig, Linde Air Products Company

C. Inert-Gas-Shielded Metal-Arc Spot Process by J. W. Kehoe and H. J. Bichsel, Westinghouse Electric Corporation

**8. TITANIUM**

A. An Investigation of the Weldability of Ti-6%A1-4%V by D. M. Daley, Jr. and C. E. Hartbower, Watertown Arsenal Laboratories

B. Aging Effects in Titanium Alloy Welds by W. L. Arter, North American Aviation

C. Problems Involved in Spot Welding Titanium to Other Metals by F. W. McBee, Jr. and J. H. Henson, Defense Research Laboratory and L. R. Benson, University of Texas

**9. SYMPOSIUM ON METALLIZING**

Note: This session is to be developed by the A.W.S. Committee on Metallizing

## October 10, Wednesday Morning—Three Simultaneous Sessions

**10. BRAZING AND SURFACING**

A. Silver Brazing Lap Joints in Stainless Steel Tubing by G. H. Bohn, Linde Air Products Company

B. Basic Characteristics of Some Heat-Resistant Brazing Filler Materials by W. Chang, General Electric Company

C. Longer Service Life Through Hard Facing for Petroleum Industry Equipment by H. S. Gonser, Wall Colmonoy Corporation

# 21 Technical Meetings Are Scheduled . . .

**11. FILLER METAL**

A. A New Nodular Cast-Iron Welding Rod for Foundries and Fabricators by R. O. Day, J. S. Snyder and H. V. Inskeep, Linde Air Products Company

B. Effects of Coating Ingredients on Surface Tension, Arc Stability and Bead Shape by T. H. Haglett, University of California

C. Electrode Control in an Alloy Pressure Vessel Plant by H. H. Weber, The Colonial Iron Works Company

**12. PIPING AND PIPELINES**

A. Status of Efforts to Develop Mechanized Pipeline Welding Methods by P. S. Reed, The Oil and Gas Journal

B. Automatic Welding of Piping by H. Thielsch and E. R. Jerome, Jr., Grinnell Company, Inc.

C. Automatic Welding Applications at the Whiting Refinery by R. C. Wheeler and R. M. Kolb, Standard Oil Company

## October 10, Wednesday Afternoon—Three Simultaneous Sessions

**13. RESISTANCE WELDING**

A. Recent Developments in Magnetic Force Welding by M. J. Funk, Precision Welder & Flexopress Corporation

B. Regulated and Programmed Resistance Welding Control Systems by C. Sinclaire, General Electric Company

C. Finish Mash Seam Welding by M. L. Begeman, University of Texas

**14. STAINLESS STEEL**

A. Properties of Austenitic Chromium-Manganese Stainless-Steel Weld Metal by H. T. DeLong, The McKay Company

B. The Plastic Ductility of Welded Joints in Austenitic-Steel Piping at 1200° by R. W. Emerson and R. W. Jackson, Pittsburgh Piping and Equipment Company

C. Further Studies on Stainless-Steel Hot Cracking by H. Rischall and P. P. Puzak, Naval Research Laboratory

**15. PRESSURE VESSELS**

A. Fabricating Aluminum Tanks by Inert-Gas Cutting and Welding by A. Meyer, Graver Tank and Manufacturing Company, Inc.

B. The Properties of Pressure-Vessel Steels in Heavy Sections by J. H. Gross and R. D. Stout, Lehigh University

C. Investigation of a Pressure Vessel Failure by J. Heuschkel, Westinghouse Research Laboratories

## October 11, Thursday Morning—Three Simultaneous Sessions

**16. WELDING AND CUTTING**

A. Aspects of Crack Sensitivity in Machinable Cast-Iron Deposits on Cast Iron by J. Broderick, Practical Welding Research Laboratory and R. D. Wasserman, and J. F. Quass, Eutectic Welding Alloys Corporation

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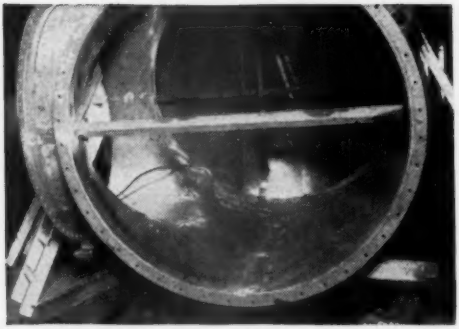

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B. Fundamental Concepts of Oxygen Cutting by R. L. Stoecker and H. B. Moen, Air Reduction Company, Inc.

C Transverse Cracking Resulting From Flame Cutting by N. N. Breyer, Continental Foundry & Machine Division of Blaw-Knox Company

**17. ALUMINUM**

A. Chlorine Additions in Inert Gas Metal-Arc Welding of Aluminum by L. A. Cook and A. R. Pfluger, Kaiser Aluminum and Chemical Corporation

B. Factors Affecting Tensile Strengths in 6061S Aluminum Butt Welds by J. W. Meyers, North American Aviation

C. The Thermal Stability of Cold Butt Welds in Aluminum and Copper by W. H. Bruckner, University of Illinois

**18. PIPING AND TUBING**

A. Study of Interrupted Welding of Heavy-Wall Steam Pipe by I. A. Rohrig and J. O. Smith, The Detroit Edison Company

B. Welding Heavy-Wall Carbon-Steel Pipe with $CO^2$ Shielding Gas by A. B. Dunning, General Electric Company

C. The Effects of Zinc Phosphate Coating on Flash Welding of Steel Tubing by J. F. Young and A. Phillips, Douglas Aircraft Company, Inc.

## October 12, Friday Morning—Three Simultaneous Sessions

**19. MOLYBDENUM AND ZIRCONIUM**

A. Fabrication and Welding of Arc-Cast Molybdenum by R. N. Monroe, N. E. Weare and D. C. Martin, Battelle Memorial Institute

B. The Influence of Nitrogen on the Ductility of Molybdenum Welds by W. N. Platte, Westinghouse Electric Corporation

C. Notch Slow-Bend Testing of Zirconium and Zircaloy-2 by R. G. Wheeler, General Electric Co.

**20. PROCESSES**

A. The Motor Arc Welding Process by C. C. Stone and R. A. Noland, Argonne National Laboratory

B. High-Frequency Continuous Seam Welding of Ferrous and Non-Ferrous Tubing by H. B. Osborn, Jr., The Ohio Crankshaft Company — TOCCO Division

C. Advancements in Stud Welding by R. C. Singleton, of Nelson Stud Welding Division of Gregory Industries

**21. SHOP MANAGEMENT**

A. Organization of Shop Management for Quality Welding by W. B. Bunn, Combustion Engineering Co.

B. Maintaining Workmanship Standards for Quality Welding by Howard Cary, Marion Power Shovel Co.

C. Importance of Standard Procedures in Proper Shop Management.

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**Carelessness can start a fire anywhere. Metal working plants which use heat and flame daily for joining and cutting of metals are usually better prepared to prevent and stop fires. However even the best prepared should periodically review the latest in fire prevention methods. Here's how to . . .**

# Prevent Welding and Cutting Fires

WELDING and cutting are two of industry's most useful and indispensable tools. With the responsibility of training workmen to employ these tools to the best advantage, there is the added need for seeing that they are used safely. With any process involving open flames and sparks, there is a particular responsibility to see that fires are kept from starting, and that those which may start, despite all precautions, are quickly put out.

There are some places in nearly every plant or shop where it is never permissible to do any sort of work which makes flame, heat or sparks. For instance, extreme care is always necessary near explosive gases or flammable liquids; and such things as smoking, torches, open lights, sparking tools, and every other possible source of ignition should be prohibited. But welding and cutting can be done in most other locations with complete safety if certain reasonable precautions are taken. When a welding or cutting operation is a part of a production process, and arrangements can be made for safeguarding surroundings and the material on which the work is being done, it is rare indeed that a fire occurs.

## How Fires Can Start

Knowing the ways that fires may start is an important step in learning how to prevent them.

Heat sufficient to start fires may come from the oxy-acetylene flame itself; from the metals being weld-

ed or cut; from molten slag and metal that blows or drips from the cut; and from sparks which fly from the work.

Some materials will catch fire from these sources of heat more quickly than others. Flammable gases and liquids, with air or oxygen present, would flare up at once. Oily waste and rags, and light materials such as burlap, excelsior, cartons, straw, and waste paper catch fire less easily but burn vigorously once started.

Wooden flooring, timber structures, scrap lumber, wood chips, tarpaulins, rags, and similar materials are even less apt to catch fire than the others mentioned. Yet this is all the more reason why special precautions must be taken with these combustible materials. For fires started in them may only smolder at first and then flare up later — due possibly to a gust of air or a natural draft created by the smoldering heat.

## Oxy-Acetylene Flame Is Misused

The oxy-acetylene flame is rarely the cause of a fire — probably because it is so evident to anyone using it that the flame and combustible materials should be kept apart. Heat from metal being welded or cut may sometimes be the cause of fires, if hot pieces of metal are allowed to touch materials that burn easily. This is more apt to happen in the case of flame cutting, because small pieces are often allowed to drop onto the floor or ground. The smaller or narrower the piece cut away, the more heat it will have absorbed, and the more likely therefore to set fire to burnable materials.

Pieces of metal which have been heated to a bright red may retain enough heat to start fires for 5 to 15 seconds, or even much longer under some conditions. Even though the piece may be at a black heat in daylight, it can scorch such things as wood or paper and a fire may start if there is enough draft.

The molten slag that drips or blows from a cut is generally more apt to set fire to nearby combustible materials than pieces of red hot metal. This is because the slag is at the temperature of molten steel when it falls, and therefore

stays hot longer. However, when the slag drops from a height of about 15 ft. or more, it tends to scatter and cool more quickly than would a small piece of red hot steel dropped from the same height. The practice of catching slag in a pan of sand or pail of water, keeps wooden floors from scorching or burning, and prevents concrete floors from spalling.

## Sparks Are Dangerous

Because cutting and welding sparks will often fly in so many directions at once, and because they sometimes travel for a considerable distance, they must be watched closest of all to be sure they do not set fires. Sparks really are little balls of glowing metal oxides, and some of the larger ones may retain enough heat to start fires for several seconds after landing. Sparks which fly from welding work do not usually travel far unless there is wind or a strong draft. They are harmless enough if combustible materials are not too

# Sparks and slag from cutting cause most fires . . .

close to the work.

It is most important to realize that sparks which fly some distance or roll along the floor may sometimes cause smoldering fires if they come into contact with materials that do not ignite readily.

Every foreman in charge of welding or cutting knows that when this work is part of a regular production or repair operation, and is carried on in the same location time after time, there is small likelihood of fires being started. There are a number of reasons for this.

In the first place, fire hazards are usually eliminated before welding or cutting equipment is installed. Any hazards that may be overlooked at first are generally taken care of after a short time, and the welding or cutting work is then well safeguarded.

On the other hand, welding or cutting work done with portable equipment in temporary locations is much more apt to cause fires, unless suitable precautions are taken. For one thing, the equipment is used in a wide variety of places — quite often places which cannot be made as proof against fire as in the welding shop. Sometimes the fire hazards are not in plain sight and are known only to the local foreman or superintendent. Often an outside contractor brings in welding and cutting equipment, and his men may hesitate to ask for the necessary assistance in preventing fires. Demolition work presents a serious problem of fire prevention due to the general disorder and litter common on such jobs.

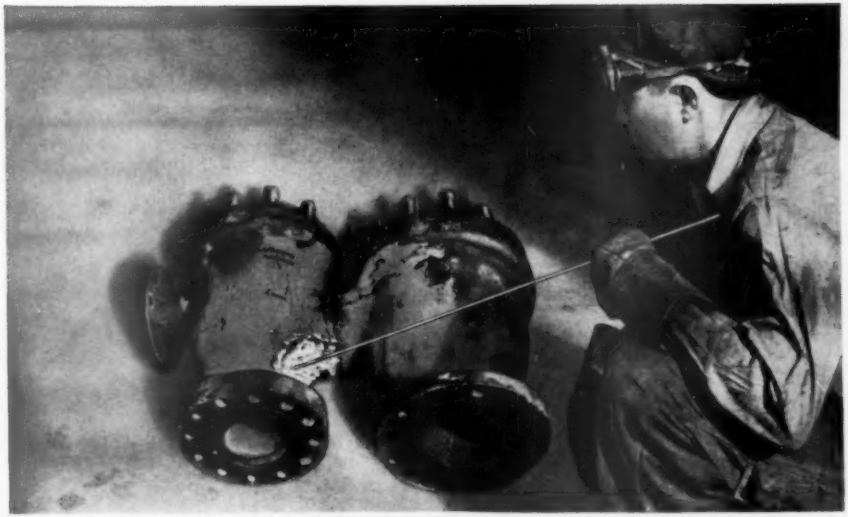
The facts are that of all fires caused by welding and cutting, about 80 per cent are caused by cutting in some places other than a permanent, safeguarded location. This will explain why the following recommendations on preventing fires are chiefly about sparks and slag from cutting work.

Welding and cutting fires are preventable. Companies that encourage their foremen to enforce these recommendations have low fire loss records even with their portable equipment.

## Rules For Preventing Fires

**1** Keep flames, sparks, molten slag, and hot metal from coming in contact with materials that will burn. Take no chances. Fires can get the best of you at times even if you are prepared to put them out. It is particularly important that this rule be observed in and around plants and buildings where there are rooms containing flammable gas or liquids, or any material that easily catches fire. Smoking, open lights, and any equipment which would cause a spark or flame are always barred from such locations.

**2** Before you cut or weld in a new location for the first time, always check with the nearest supervisor in authority. He may know of some serious fire hazard that



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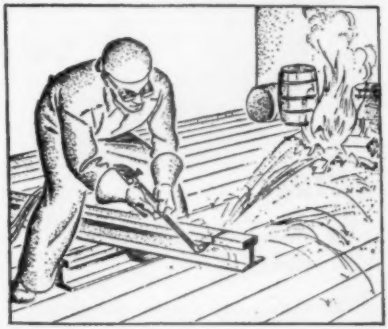
you might fail to guard against.

**3** Take cutting or welding work which can be moved to a location where there will be no possibility of setting fires. This must always be done where open flames are barred. This practice is also advisable in other locations even if other open flames are permitted.

**4** If work cannot be moved to a safe distance, remove materials that burn easily, if possible. If cutting is to be done, this distance may be 30 to 40 ft. or more. Floors should be swept clean before the torch is lighted. If it is not possible to move combustible material to a safe distance from the work; or if sparks might lodge in wooden parts of the building, or drop through holes or cracks to the floor below—

**5** Use sheet metal guards, asbestos paper or curtains, or similar protection to keep sparks close in to the work you are doing. Make sure that guards are large enough and tight enough to prevent sparks from rolling underneath or sliding through openings. Curtains should be weighted to the floor with noncombustibles such as bricks, angle iron. Use only fire-resisting guards. Do not use tarpaulins for shielding sparks since they may catch fire. Have someone stand by to watch so he can give warning if sparks begin to get beyond the protective guards. It is not reasonable to expect whoever is welding or cutting to watch the sparks, as his attention is on the work. In addition, the sparks cannot be seen easily through his goggles.

**6** Sweep wooden floors clean and wet them down before starting work. Provide a bucket or pan containing water or sand to catch the dripping slag from any cutting that is done. Keep all sparks close to the work as recommended in the rule above. Before starting to cut off a piece of metal make sure it will not drop where there is any possibility of starting a fire. This is especially important when working in a high place where sparks or slag might be less apt to cause a fire down below than would a small piece of red hot steel. Pieces can be kept from falling by welding a rod or bar to the piece, and



having a helper hold the rod or bar while the cut is made. Or the same thing can be accomplished by tying a chain or rope to the piece.

When welding very close to wooden construction, such as wooden beams, partitions, flooring or scaffolding, always use sheet metal guards or asbestos to protect the wood from the direct heat of the flame. Of course, protective guards should also be used to confine the sparks.

**7** Always guard the oxygen and acetylene hose from injury on the job. Acetylene escaping from a broken hose line might easily catch fire and then transmit fire to cylin-

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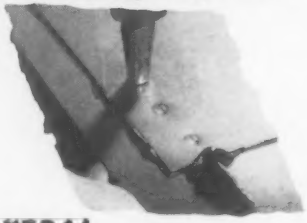

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ders or other materials nearby. Make sure that torches, regulators and hose are always in good, safe condition and that all connections are tight. Use soapy water to test for leaky connections.

**8** Use the correct oxygen pressure when cutting. An oxygen pressure greater than necessary will only cause extra sparks and increase the slag flow, to say nothing of increasing the oxygen expense.

**9** Store extra cylinders away from important areas. Keep only enough cylinders near the work to insure an adequate supply of gases for the job at hand.

**10** Be ready to put out any fire promptly with fire extinguishers, pails of water, water hose or sand. Have a helper, or one or more extra men if necessary, on hand ready to extinguish a fire.

**11** Maintain sprinkler protection wherever possible while cutting or welding is being done. If your work area is provided with sprinklers, make sure they're working during extensive repairs or building changes. If sprinklers must be shut down for a time, have this done, if possible, when welding or cuting work is not in progress.

**12** Keep a man at the scene of the work for at least half an hour after the job is through. Have him look carefully for smoke or fire before leaving. If sparks have lodged in wooden structures or materials that will burn, they may cause smoldering fires. Don't forget that heavy cutting sparks sometimes fly 25 to 30 ft. or more and hold their heat for several seconds after landing.

When conditions indicate necessity for a longer watch period and a special watchman cannot be assigned, the plant watch service should be notified to pay particular attention to the area. If you don't have a watch service, stay at the scene of the work yourself. Don't leave until all possibilities of a fire have been eliminated.

*These rules and recommendations are based on the combined experience of oxy-acetylene equipment users, equipment manufacturers, and members of National Fire Protection Association, National Safety Council, and International Acetylene Association. They are adapted from material prepared by International Acetylene Association, 30 East 42nd Street, New York 17, N. Y.*

## Pocahontas Welding Supply Holds Open House

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**In conjunction with Fire Prevention Week, October 7-13, INDUSTRY & WELDING presents these basic facts which can help to eliminate much of the destruction and loss of life caused by fires. Here's . . .**

# How to Choose and Use Fire Extinguishers

EXPERIENCE can be a grim teacher when the lesson is taught by an industrial fire. To help you avoid such an experience, the Fire Equipment Manufacturer's Association offers the following basic information on the selection of fire extinguishers.

**"All fires are not the same, adequate protection depends on having the right extinguisher at the right place."**

Fires magic number is three; three essentials to start a fire, three basic methods of fire control, three classes of fires and three ways to propel extinguishing agents.

The three essentials of a fire are heat, fuel and oxygen. The principles of fire control lie in the elimination of any or all of these three essential requisites.

It is the rapid combination of oxygen with elements in the fuel with the accompanying manifestations of heat and light that we commonly call fire. Usually a concentration of 15% oxygen must be maintained for a fire to continue. Oxygen control or elimination is accomplished by smothering. Fuel control includes any action to make the combustible material non-combustible — either temporarily or permanently.

Fires are classified as Class A, B, and C. The three types of fires and their methods of control are:

**Class A.** Paper, wood, cloth, excelsior, rubbish and similar combustible material containing carbonaceous matter. These can be extinguished by lowering the temperature of the fuel with water or water solutions.

**Class B.** Where the fuel consists of gasoline, oil, grease, paint or similar volatile material. Control these through eliminating oxygen by blanketing with a chemical foam, dry chemicals, vaporizing liquids and/or nonburning gases such as carbon dioxide.

**Class C.** Electrical fires. Nonconducting materials such as carbon dioxide, certain vaporizing liquids and/or dry chemicals must be used to control the fire by cutting off the oxygen supply.

There are three basic methods of propelling extinguishing agents from portable extinguishers. They are:

1 Stored pressure methods using carbon dioxide or nitrogen cartridges or stored air pressure.

2 Internal chemically generated pressure methods. The soda-acid extinguisher which generates carbon dioxide gas is a familiar example of this type.

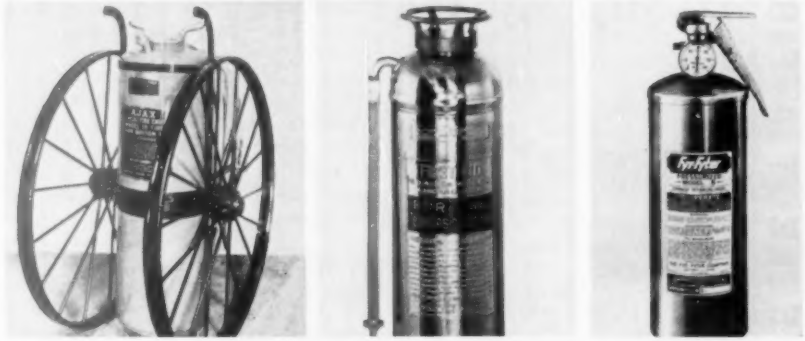
3 Hand generated pressure. This method is employed on vaporiz-

## These extinguishers are typical of those being used for fire prevention in welding shops and departments . . .

Non-conductors of electricity, dry chemicals are ideal for putting out live electrical fires and can be used to smother burning liquids.

Basic water content of soda-acid extinguishers provides economical protection against wood and paper fires.

Carbon tetrachloride is used on most fires.



Ideal for live electrical fires, carbon dioxide extinguishers do not damage electrical equipment.

Water filled extinguishers are used on paper, wood, rubber and general combustible fires which require cooling and quenching. They are subject to freezing unless chemical is added.

# HOW TO SELECT A FIRE EXTINGUISHER

| | Carbon Dioxide | Dry Chemical | Vaporizing Liquid | Foam | Soda Acid | Water |
|---|---|---|---|---|---|---|
| **CLASS A** Paper, wood, excelsior, rubber and general combustible fires requiring cooling and quenching. | Small Surface Fires Only | Small Surface Fires Only | Small Surface Fires Only | **YES** Foam clings to vertical surfaces, wets and smothers. | **YES** Soda-Acid is economical protection . . . quenches and cools. | **YES** Water is excellent protection; it cools and quenches. |
| **CLASS B** Burning liquids (gasoline, paint, oil, grease, etc.) demand a smothering action for quick extinguishment. | **YES** Has no ill effects on food and leaves no residue. | **YES** Chemical smothers fires | **YES** Vaporizing liquid is converted into a gas —which smothers the fire. | **YES** Heavy foam blanket on surface of burning liquids smothers | **NO** Basic water content will spread liquid fires. | **NO** Water will spread fire, not put it out. |
| **CLASS C** Live electrical fires (motors, switches, appliances, etc.). A non-conducting extinguishing agent must be used. | **YES** Carbon dioxide is non-conductor; will not damage costly electrical equipment or leave residue. | **YES** Dry chemical is non-conductor of electricity. | **YES** Liquid is non-conductor, and will not damage equipment. | **NO** Foam is a conductor and should not be used on electrical equipment. | **NO** Should not be used on live electrical equipment; basic water content will conduct. | **NO** Water, a conductor should not be used on live electrical conductor. |
| **UNDERWRITERS' CLASSIFICATIONS** | 2½ & 5 lb. B-2, C-2 10 lb. B-2, C-1 15 & 20 lb. B-1, C-1 and up | B-1, C-1 | 1 & 1½ qt., B-2 C-2 1 & 2-gallon, B-2, C-1 | A-1, B-1 | A-1 | A-1 |
| **SUBJECT TO FREEZING** | No | No | No | No | NO | Yes, unless chemical is added. |
| **EXTINGUISHING AGENT** | Carbon Dioxide | Dry Chemical | Heavy vapor formed from liquid by heat. | Foam Bubbles | Soda Solution and Acid | Water |
| **RANGE** | 5-10 feet | 10-25 feet | 20-30 feet | 25-35 feet | 30-40 feet | 35-50 feet |
| **EFFECT ON FIRE** | Smothers | Smothers | Smothers | Smothers and Cools | Cools and Quenches | Cools and Quenches |

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# Follow instructions of extinguisher manufacturers

ing liquid types of water pump tanks.

All of these factors influence the selection and use of extinguishers. To have the right extinguishers available when needed, consider all of these factors when selecting new extinguishers or when making a safety survey of present equipment. Use the chart as a handy guide to help in your selection of a proper type extinguisher for your own specific problems.

## Proper Care Essential

Improperly maintained fire extinguishers may mean ineffective fire protection in case of emergency. Ineffective fire protection means danger, high dollar losses, and possible injury and death.

A regular planned program of fire extinguisher care and maintenance will keep extinguishers ready for any emergency which may arise. The following is a condensation of the "Safety Code For Inspecting, Recharging and Maintaining Portable Fire Extinguishers" prepared by the Fire Equipment Manufacturers' Association, Inc.

All extinguishers should be examined at regular intervals (several times a year) to make sure that they have not been tampered with or removed from their designated places, to detect any injuries and to see that they are in full working order, ready for instant use. Recharging of extinguishers should be done under capable supervision and the date of recharging and signature of the person who performed it put on the tag attached to each extinguisher.

In hydrostatic pressure tests (except for carbon dioxide extinguishers) the pressure should be applied gradually to reach in about one minute's time at least 300 lbs. per square foot, but not over 350 lbs. for hand types, or over 400 lbs. for wheeled types. Hold pressure for one minute and release. If extinguishers shows any leakage, distortion or other weakness, it should be discarded, first mutilating it to prevent future recovery and use.

General rules for care and inspection of various types of extinguishers are as follows:

## Vaporizing Liquid Type

Should be kept full at all times and examined at least once a year for condition of pump or pressure and any deterioration or damage. Test its operating condition by discharging a small amount of the extinguishing agent and refill according to the manufacturer's instructions. If extinguishers of the stored pressure type are corroded or injured, they may be unsafe and should be returned to the manufacturer for examination.

To recharge, follow instructions on name plate. Never use water in vaporizing liquid extinguishers for any purpose. Use only recharges furnished by the manufacturer.

## Soda-Acid Type

Protect from freezing temperatures. If extinguisher shell or seams are damaged, corroded or distorted, unit may be unsafe and should have a hydrostatic pressure test. It should also be pressure tested every five years.

In recharging, clean the interior and all parts with warm water and run water through hose and nozzle. Be sure there are at least four full threads in good condition on the head and be sure head is returned to same extinguisher from

which it came. Replace hose and head gasket if unserviceable. Use only recharges furnished by the manufacturer of the extinguisher and follow his instructions. Acid bottles and their stopples should be exact duplicates of those originally provided.

### Chemical Foam Type

Protect from freezing temperatures. If extinguisher shell or seams show evidence of mechanical damage, corrosion or distortion, unit may be unsafe and should be subjected to hydrostatic pressure test. It should also be pressure tested every five years.

Chemical foam extinguishers should be recharged annually and right after use. Clean extinguisher interior and parts with warm water and run water through hose and nozzle. Heads should have four full threads in good condition and should be fitted only to the original extinguishers from which they came. If hose, head gasket, inner chamber or loose stopple are unserviceable, replace. Use only recharges furnished by the extinguisher manufacturer. The two chemical recharges should be mixed in separate containers and be thoroughly dissolved before placed in inner and outer chambers. Follow the manufacturer's instructions and do not fill either chamber beyond the solution level mark.

### Cartridge-Operated Water Type

Protect from freezing temperatures. Examine shell and seams for signs of mechanical damage, corrosion or distortion. If there is evidence of weakness, subject extinguisher to hydrostatic pressure test. Weigh the carbon dioxide pressure cartridge to detect loss by leakage. If cartridge has lost ½ ounce or more, replace with unit of the same make.

Recharge immediately after use and inspect periodically to see that water level is up to proper mark. Clean interior and parts with warm water and run water through hose and nozzle. Examine threads on head, making sure there are at least four full threads in good condition, and return head to same unit from which it came. Replace hose, gasket and cartridge if unserviceable. Check cartridge puncturing mechanism.

### Cartridge-Operated Anti-Freeze Extinguisher

Inspection, maintenance and hydrostatic pressure test are the same as for the Cartridge-Operated Water Type.

In recharging, the anti-freeze solution chemical supplied by the manufacturer should be dissolved in water outside the extinguisher and according to instructions on recharge package. In filling extinguisher, pour solution through a fine strainer.

### Pump Tank Water Type

At least once a year, examine the condition of the pump. Also test by pumping several strokes. Return solution to tank and put drop of thin lubricating oil on piston rod packing.

If an anti-freeze solution is used, following manufacturer's instructions, dissolve solution outside the extinguisher, and pour through a fine strainer when filling.

### Carbon Dioxide Type

During periodic inspections, check weight of unit. If charge is 10 percent below normal, recharge

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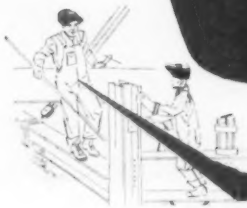

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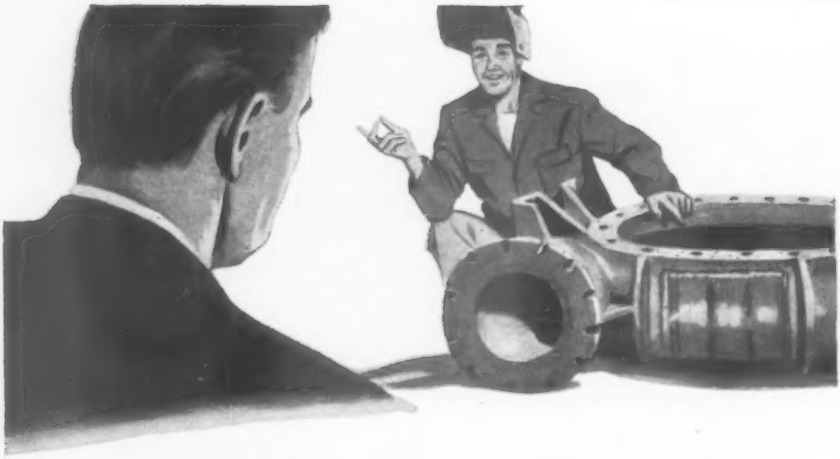

# Nick finds out about welding underwater vacuum cleaners

'Nick,' says my boss, 'I certainly *hate* to see you suffering in the heat . . .' And he smiles at me.

(I'm getting ready to thank him, 'cause the day sure was a scorcher. Then he finishes his sentence.)

'. . . so I've figured out something *cooler* for you to do. Go out to the address on this paper . . . ask for a weldor named Leo . . . and learn something about *underwater vacuum cleaners.*' And he walks out laughing before I can say a word.

### Clean rugs for lobsters

It turns out that Leo works for a dredging company. And he starts right off telling me about this cast iron casing for a dredge pump. It picks up sand and gravel from the ocean bottom—just like an underwater vacuum cleaner! Well, a couple of days before, a rock tore a big hole right through the two-inch thick casing.

'The casting cost $1,500,' Leo says, 'and I was sure I could save it. Yesterday I cut grooves in a steel plate. Formed it to fit over the hole. I welded the outside with four passes of Ni-Rod "55"* electrode. This morning I welded a smaller steel plate to the inside, and hard-surfaced it. The whole job took me only six hours.'

### Welds outlast an impeller

'That's pretty good welding, isn't it?' asks Leo. It *was*, but I can see he doesn't want an answer or any other interruption.

'Some time back I did just as good,' he continues. 'Rocks broke about six inches off every vane on a $1,200 pump impeller . . . a special-alloy casting. So I welded steel sheet to each vane with Ni-Rod "55". And the vanes were *still* in good condition when the rest of the

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impeller wore out.'

'Just like I always tell the fellers,' I says, 'with Ni-Rod "55" you can expect good results in *all sorts* of cast iron welding . . . even in heavy sections like the pump casing . . . even when you weld dissimilar iron alloys, like on the impeller.'

**Why we got treated**

Just then *Leo's* boss walks in and sees that $1,500 pump casing *as good as new.* And didn't his face light up!

'Well,' says he, 'this calls for a celebration. Now that you've learned about underwater vacuum cleaners, I know *your boss would want us all to keep cool at the ballpark.* And thanks to Leo's quick talking, we still have time to go!'

**Send for this handy guide**

If you haven't written for "A Handy Guide to Welding Cast Irons," you're missing something good. It's a new illustrated booklet that gives you *many* valuable tips — on preparation, welding techniques, welding heavy sections, stress-relieving welds, and *lots* more. Send for your copy.

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Nick Rodder

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## FIRE EXTINGUISHERS . . .

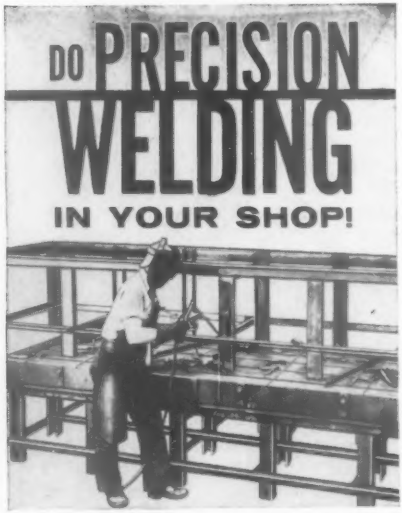
*(Continued from Page 113)*

to proper weight. If unit is empty and shows no evidence of being discharged, check for: 1. ruptured safety disc, due to excessive pressure from high ambient temperature (replace disc with one of correct size and material as specified by the manufacturer); 2. leaks in packing (discharge the extinguisher, repair, recharge and test for further leakage); 3. deterioration of cylinder (subject unit to the special hydrostatic pressure test for carbon dioxide extinguishers described below). If a carbon dioxide extinguisher has been in use for five years and is to be recharged, it should undergo hydrostatic pressure test, as follows:

### Test $CO_2$ Extinguishers

Carbon dioxide extinguishers should have an internal hydrostatic pressure test in a water jacket to determine the expansion of the cylinder and should include visual internal and external examination. The pressure should be 5/3 the service pressure of the cylinder and applied for at least 30 seconds or as long as deemed necessary. Cylinders having a permanent expansion in excess of 10 percent of the total expansion, and/or any of the following defects should be condemned: 1. loss of metal thickness by localized pitting or large area corrosion, amounting to more than .005-inch for a cold drawn cylinder or 1/32 inch for a hot forged cylinder; 2. loose scaly material on the outside of the cylinder, easily broken away by hammering or jolting; 3. foreign deposits or inclusions on the outside cylinder wall or bottom. If cylinder is usable, record date of test under original date of test on dome of cylinder.

To discharge cylinder before re-

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charging, equip outlet with suitable device to prevent recoil. In recharging, be sure cylinders are dry internally and free of rust or foreign matter. In reassembling valve to cylinder, apply torque specified by manufacturer. The carbon dioxide supply, whether from cylinder or a liquifier, should be in a liquid state and between zero and 88 degrees F. Place extinguisher on a scale during recharging operation. Do not exceed the weight permanently marked on the extinguisher. After charging, place unit under water for visual evidence of leakage; then dry thoroughly.

Carbon dioxide extinguishers should not be located where temperature is over 130° F. If temperature is higher, extinguisher should be undercharged according to recommendation of manufacturer.

## Cartridge-Operated Hand Dry Chemical Type

Examine at least every six months to see that seal wires are in good condition, the orifice of the discharge nozzle isn't clogged, and there is no evidence of shell damage or distortion.

Examine at least once a year to see that the weight of the carbon dioxide pressure cartridge meets the manufacturer's specifications, the passages for carbon dioxide gas and dry chemical are clear, dry chemical is free-flowing and neither above nor below the prescribed weight, the nozzle and cartridge-operating devices are free operating, and hose and sealing gaskets are undamaged.

In recharging, follow the manufacturer's instructions and use only recharges furnished by manufacturer. After use, release pressure and inspect any dry chemical remaining in the shell. Refill to rated capacity. Replace charged cart-

ridge according to manufacturer's instructions.

### Pressure-Operated Hand Dry Chemical Type

Examine at least every six months to see that seal wires are in good condition, pressure meets prescribed limits, orifice of discharge nozzle is clear, there is no mechanical damage or distortion, and unit is full charge by weighing.

In recharging, follow manufacturer's instructions. After use, release pressure to clear hose and relieve pressure. Use only dry chemical furnished by manufacturer. Pressurize as specified by manufacturer.

### Wheeled Dry Chemical Type

Examine regularly to see that wire and lead seals are not broken, discharge nozzle is in closed position and unclogged, and extinguisher and hose are undamaged.

Examine annually to see that the nitrogen pressurizing cylinder is properly charged, hose is clear of dry chemical, nozzle is unclogged and undamaged, hose coupling and nozzle connectors are tight, and extinguisher and hose are free of damage or corrosion.

In recharging, use only dry chemical furnished by manufacturer and follow his instructions. Release pressure in extinguisher. Recharge nitrogen cylinder if pressure is below minimum. Turn valves to proper position.

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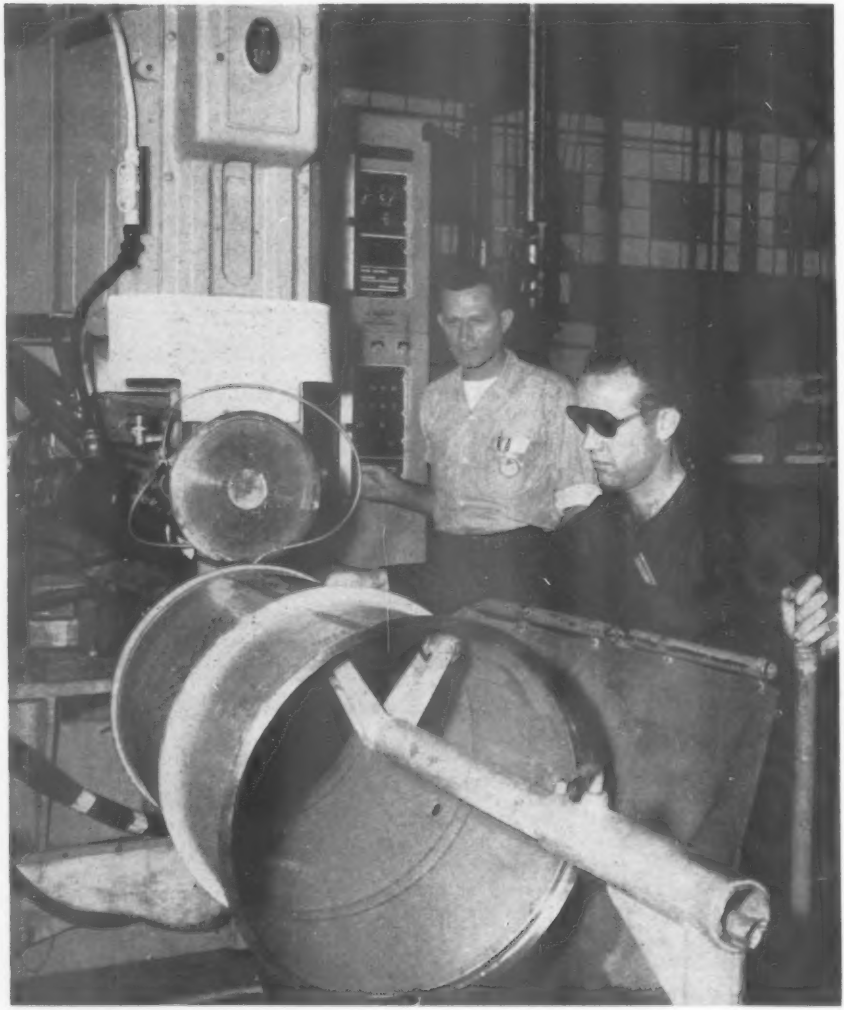
**Economical and fast indexing drive mechanism for roll-spot welding has doubled welding speeds at Ryan Aeronautical Co. Gas-tight seam welds are now made at 26 inches per minute.**



**Gas-tight seam welds are made in tough stainless steels** and other crack-sensitive alloys used in high temperature jet engine parts by spot welding with machines having fast-indexing drive mechanisms.

# Ryan Gets 133% Increase in Roll-Spot Welding Speeds

NEW roll-spot welding techniques and modified facilities have stepped up welding speeds more than 100 percent and improved weld quality at Ryan Aeronautical Co. San Diego, Calif. Using specially equipped machines, Ryan is producing gas-tight seam welds at 26 inches per minute compared with speeds of between 6 and 12 inches per minute formerly achieved. Spot welds on 1-inch spacings can be installed at 68 inches per minute in contrast to the former rate of only 21 inches per minute.

## Weld Tough Stainless Steels

This accelerated performance is attained in the welding of tough stainless steels, Inconel X and W, Haynes Stellite No. 25 and other crack-sensitive alloys used in the fabrication of Ryan built afterburners, variable nozzles, exhaust cones, tail-pipes and high temperature jet engine components.

For this work Ryan is using new machines which have been equipped with fast-indexing mechanisms for roll-spot welding. These devices are air-operated, electronically-controlled units consisting of two horizontally-opposed bellows which actuate an over-riding clutch. Powered by standard air line pressure of 80 psi, the clutch rotates the upper wheel electrode of the machine. By pressing a switch the continuous electric seam welding drive mechanism is detached and the roll-spot drive takes over. It can be set by indicator to index in single or multiple movement and spot weld at spacings from zero to five inches.

## Advantages of New Controls

The new controls are a distinct advantage over the Geneva-type drives used heretofore. With the Geneva drive, limited flexibility is available because the proportion between the dwell time and indexing time is a fixed ratio depending upon the gearing and drive mechanism. It can be varied in fixed increments only. The new air-operated drive provides infinite flexibility in varying dwell and indexing time ratios.

Although the new mechanism was developed to accomplish spaced out spot welds at increased speeds, Ryan spot weld engineers Robert Fullerton and Fred Dever have conceived another application for it—faster seam welding. With continuous drive machines, certified, gas-tight seam welds could not be formed at speeds exceeding 6 to 12 inches per minute in the crack-sensitive alloys. When these rates were exceeded the metal temperature rose to the point where undue shrinkage and distortion occurred and cracks developed.

Careful analysis of this phenomenon disclosed that it required a large number of overlapping spot welds to produce gas-tight seams with continuously rotating electrodes because each spot weld was inferior to that produced under static conditions. Consequently,

the sheets during cooling, shrinkage and distortion from heat were greatly reduced.

With sounder spot welds avail- Ryan technicians directed their efforts toward attainment of the speediest intermittent operation commensurate with high quality.

### How Drive Was Speeded Up

The drive was speeded up even beyond its already rapid action. Exhaust mufflers were changed and a design which exhibited less back pressure was installed. A Ryan-improved air intake valve, with snappier action, was incorporated. A new type of faster-meshing gearing is being developed by Ryan to provide more speed.

With these facilities, Ryan engineers worked out new performance ratios in which time was compressed to the minimum. Dwell time, during which the electrodes are motionless, was reduced to the shortest possible interval but kept long enough to produce sound spot weld structure. Indexing time, which is time lost in making the switch to the next spot weld location, was also cut to the bare minimum. Because of the flexibility of the equipment, these time ratios could be coordinated for different materials and thicknesses with complete freedom.

### Make Better Spot Welds

Once precision control of intermittent operation was attained it was found that better spot welds could be accomplished than under continuous operation. The spot weld nuggets were sounder because the metal was held under forge pressure during the cooling cycle and a larger, stronger nugget was made. Also, by holding

*(Turn to Page 122)*

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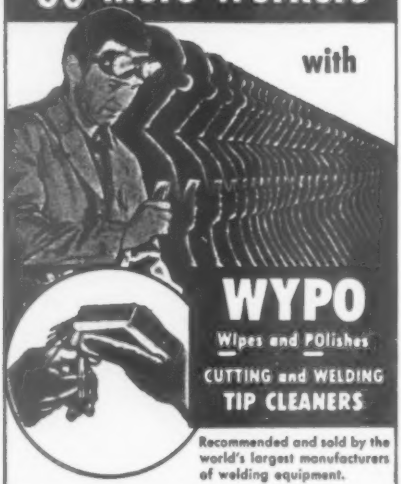


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## ROLL SPOT WELDING . . .

*(Continued from Page 120)*

able, it became evident that gas-tight seam welds could be formed with fewer spot welds and at greater speeds. This has proved to be the case. For instance, on a typical Ryan afterburner assembly formed from two sheets of .045" Inconel W, Ryan previously had to install 11 overlapping spot welds per running inch to form certified seams under continuous drive. Because of the proximity of the spot welds, this work could not be done at speeds exceeding 12 inches per minute due to the heat accumulated. With the new roll-spot technique, Ryan is performing certified seams with only five-and-a-half spot welds per inch and can make 26 inches of seam per minute.

### Other Uses for New Technique

For spaced out spot welding, the new technique is equally satisfactory. In spot welding a General Electric J-47 jet engine tail-pipe Ryan installs 300 spot welds on one inch centers in one seam. These can be installed at 68 inches of seam per minute compared with the former rate of only 21 inches per minute under standard methods. With improvements now being developed, speeds of 80 inches per minute will be realized. This reduction in time allows Ryan to spot weld five of these assemblies in the same time which was required to do two with previous means.

Economically, the innovation presents an attractive picture. The drive costs about fifteen percent of the cost of a new machine. For that amount, it is quite possible to get twice the capacity from a machine, making it perform the work of two, without devoting added personnel or floor space to the job.



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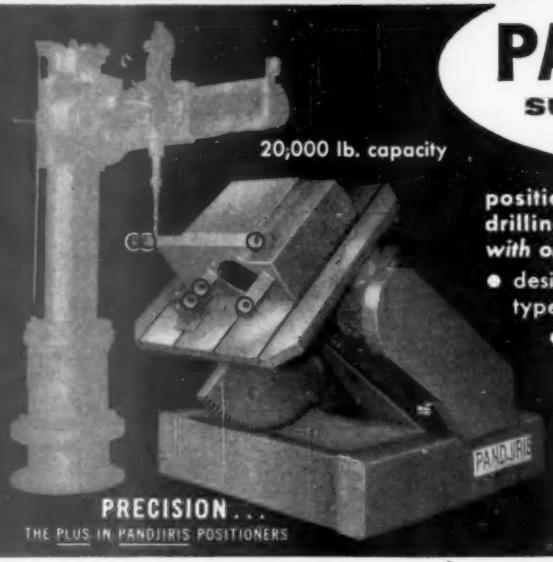


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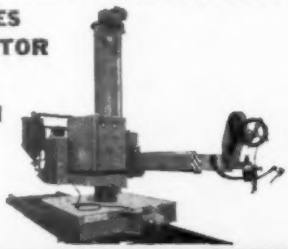

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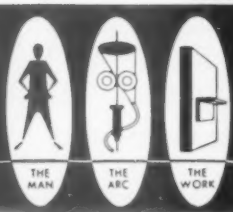


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**Each industry using welding and, in fact, each shop has its own particular problems in organizing for better welding. An organization that may be essential for one firm can be economic poison for another firm in a different industry. It must be remembered that welding operations are subject to economic laws as well as the laws of metallurgy and other sciences.**

# Shop Management for Better Welding

by **LEW GILBERT, Executive Editor**

IT IS THE jobbing shop manufacturing operation, which may have ten to five hundred men employed in the welding department, where management control for adequate welding is critical, and yet where there is often not even a periodic review of the existing situation. This often results in a static condition which continues until the time of a production or quality crisis, matters are patched and the shop operates to the time of the next crisis.

The idea of a periodic review of conditions is believed important, even in shops that do not show symptoms of difficulties. Shops that have welding as an operation of major importance are seldom in a static condition in regard to type of work, work load, quality requirements in the product and other factors that have a bearing on the optimum organization. And, incidentally, this review does not imply a shake-up in personnel but rather a review of the time and effort distribution of the personnel. The lines of communication must be kept straight and orderly, and paper work at a minimum. In many of these considerations a welding

## CREDIT WHERE CREDIT IS DUE

Believing that experience is the best teacher, the author conducted a one man poll to find out what constitutes good shop management. In large plants and small he asked shop managers "What do you consider essential to good shop management for good welding quality?" This consensus is the result.

Special consideration is given the opinions expressed by the following authorities on the subject: William B. Bunn, Combustion Engineering, Inc., (formerly with M. W. Kellogg Co.); Howard Cary, Marion Power Shovel Co.; K. L. (Ken) Walker, Foster Wheeler Corp., and Ross Yarrow of Consolidated Iron-Steel Mfg. Company.

These are their opinions, their experiences. These are the methods they use, individually and collectively, to produce high quality welding through proper shop management.

**Editor's Note:** The author is serving as Chairman of a Technical Meeting on Shop Management at the October Fall Meeting of the American Welding Society in Cleveland, Ohio. Speakers on Mr. Gilbert's program include Messrs. Bunn and Cary and a yet to be announced speaker.

shop is subject to the same rules for good effective management that apply to other types of manufacturing operations.

For each individual shop there are many factors which influence the approach to organizing for better welding. Here are some of these factors.

## Classify Welded Products

Classification of product as to production, semi-production or jobbing items of non-repetitive nature. To a certain, probably limited, degree this classification will determine the strength required in the first line of supervision. The latter type of work often requires initiative, resourcefulness, and the ability to plan fabrication steps through to completion, or to constructively criticize plans made by others. Initiative by first line supervision applied to production items, may not be as essential in its application to any given job, but its application toward total savings through process improvement may be much greater. Responsibility for procedures on staff organizations unfettered by the problems of meeting this month's schedule.

Production or job shop, it should be recognized that all shop supervision through the General Superintendent or Works Manager should be versed in at least the basic fundamentals of the welding processes being used. This is essential to get the greatest benefit from lower echelon supervision who often will not propose an idea if he knows from experience that it will require extensive explanations. This type of shop supervisor is often not expressive and is embarrassed by a superior's probing to reach fundamentals.

## Welding Experience Is Important

The background or past experience of a shop with a given product,

## Nine Steps to Better Weld Shop Management

1 Review time and effort distribution of weld shop personnel.

2 Classify products as production semi-production or jobbing item of non-repetitive nature.

3 Analyze past experience of shop to determine need and strength requirements of staff function.

4 Maintain close control of all variables.

5 Make sure top management, engineering and design are welding minded and know something of advantages offered by welding.

6 Do not neglect operator training and qualification programs.

7 Standardize welding applications, procedures and methods and cost control programs.

8 Strive for mechanization of all processes so human element can be eliminated.

9 Do not neglect strict quality control and careful inspection during all phases of welded fabrication.

or with the use of the applicable welding process, will be an important factor in determining the need and strength requirements of the staff functions. If final inspection develops a negligible amount of rejections or rework, it is obvious that floor inspection and extensive quality control by inspection or welding engineering is superfluous. Under these conditions technical welding talent, if available, can devote itself to process improvements.

Where should inspection and welding engineering report organizationally? Inspection should report to the highest ranking official concerned with production who is in close contact with the shop. This official should be of sufficient rank to be responsible in the broadest sense for quality as well as production schedules. He may be the owner, the president, a manufacturing vice president, or even a chief engineer. Welding engineering and shop metallurgists often serve design engineering groups, estimating and sales and other production staff organizations.

### Production Is Chief Function

However, their chief function is normally with production. Their operations may vary, as circumstances dictate, and may include design questions, shop equipment recommendations, quality control work, personnel training, experimental procedure or development work and even customer relations activities. The breadth of their work will be determined to some extent by the degree of specialization that can be afforded, which is often a function of the size of the organization.

For the medium size operation which may have a welding engineering or shop metallurgical staff of two to five people it is believed that the staff should report to the shop general superintendent or works manager. At this level there is sufficient cognizance of detailed shop operations to best direct the technical activities connected with operation of the shop, and yet it is high enough to demand and obtain compliance with recommendations made by a service or staff group.

### Communication Is Problem

In a small organization most questions or problems are common knowledge and solutions are often arrived at by joint effort, or more often by one man and agreed to by all concerned. As organizations grow in size and complexity the communications problem becomes more acute. Either too many people want to know and have a finger in everything, which becomes extremely wasteful of time; or on the other hand those who are concerned and can be useful in solving problems are not consulted.

A partial answer here is the judicial use of conference management. With all of its disadvantages it can be an effective tool if studied and used wisely by its leader. It can bring into focus not only the current problems and their solution, but also the best means of operating with a minimum of problems and with maximum efficiency in any given shop. Before any manager makes a decision regarding the suitability of some form of conference operation, he should read the uniquely illustrated "Conference Sense", published by the

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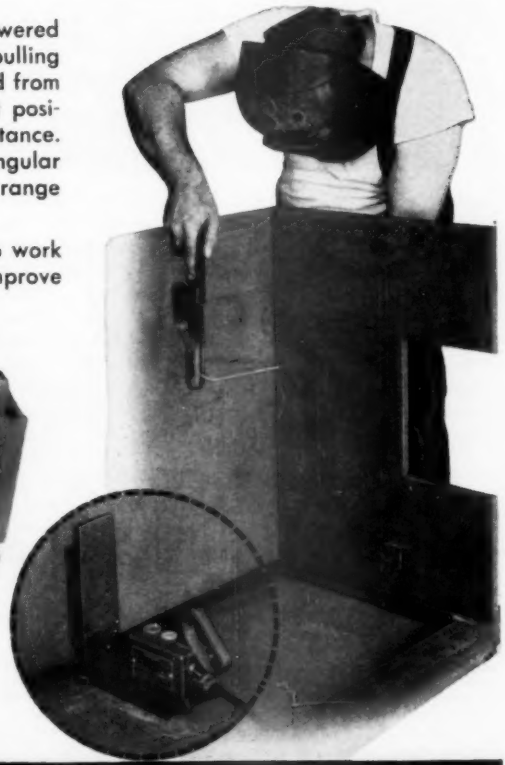

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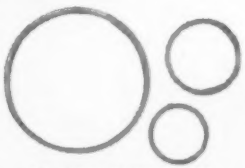

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### Quality Starts With Engineering

In shops where there is an engineering department, the approach to good welding quality begins with that group. Each job should be designed for welding — and the welding procedure designed especially for the job. Specific information as to types and sizes of welds, necessary quality control, allowable tolerances, etc., should be clearly indicated so that foremen and supervisors have a clear understanding of requirements.

All the way down the line in shop management, emphasis should be placed on importance of maintaining close control of all variables. From forming and preparation for welding through final inspection, good quality results from the cooperation of all shop workers.

### Welding Minded Management

Several basic facts stand out clearly in fabricating shops of all types and sizes. Top management must first be welding minded, must know something of the advantages offered by welding, before any approach to quality can be considered. It is also necessary that Engineering and Design groups be welding minded and informed.

Close liaison between management and shop people, from scheduling, through purchasing, preparation for welding and final shipping, is of particular importance. This cooperation, of course, involved certain rules previously set up and understood by both groups. These are concerned with types of shop equipment to be used, workmanship standards, fit-up requirements, plant facilities, etc.

At Marion Power Shovel, a large heavy fabricating shop in Marion, Ohio, a specific shop code has been devised. This standard tool, used by shop management to obtain better welding quality, is called "Welding Workmanship Standards."

### Train Your Operators

Operator training and qualification programs are often neglected in some of the smaller and medium size shops. In this large shop qualified welding operators are hired and, by means of on-the-job training and systematic upgrading, are developed into highly skilled craftsmen. No special testing program is involved except at the beginning and end of training periods. Where qualified operators have not been available, men have been upgraded from lesser skilled occupations through carefully planned training programs.

Adequate control and careful inspection procedures are necessary for proper welding quality. An inspection plate tack welded to each weldment and properly stamped at various inspection points, can provide a good check point for supervisors. By periodic examinations of this plate they can be assured that the weldment has had sufficient inspection to meet quality requirements.

### Keep Permanent Records

For specific jobs where quality control is critical, log sheets should be maintained by inspectors, checked by supervisors, and kept as a permanent record for each job. Of course it is essential that both inspection and supervision be capable and well enough qualified to command respect of welding oper-

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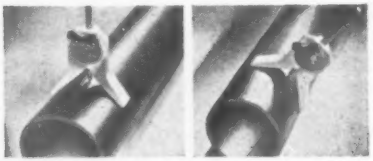

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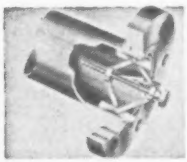

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ators; to demand optimum quality performance.

### Standardization Is Important

One of the most important requirements for good welding quality is standardization of welding applications, procedures and methods and the control of costs by means of Production Engineering.

Proper shop management requires that work be processed so that the Welding Department will be working with consistent standard procedures. If there are six supervisors, then certainly we cannot have six different approaches to a particular welding problem. Production Engineering lends itself to the resolution of such a requirement. The methods and procedures, the welding materials, the tooling, and the welding equipment must be standardized and controlled for repetitive operations. Welding procedures should be spelled out so that the operator follows a proven and acceptable procedure with consistent performance. Quality and the cost of a product can only be controlled by an engineered approach.

### Promote From Within

It is desirable that the welding supervisor have as broad an academic and technical background as possible. In any event he must have had practical experience related to the product being manufactured. It is, therefore, desirable to promote supervisors from within the organization since they have the benefit of familiarity with the product and the specification requirements.

The supervisor must be thoroughly versed in Code requirements, specifications, and be thoroughly familiar with engineering drawings of the products. The supervisor must show qualities of leadership that will enable him to

direct the operations of his welders so that they can fulfill all of the requirements of a procedure within established process time. He must possess an inventive mind and be constantly alert for the adaptation of new methods to meet or improve on the process time.

### Eliminate Human Element

Good shop management should constantly strive for the mechanization of all processes to eliminate the human element. Applications for machine welding should be sought so that manual welding procedures can be reduced to an absolute minimum. Shop management should set up operations so that specialists are trained for various applications, such as submerged welding, inert-gas welding, metal-arc welding, etc.

Shop management for better welding demands that layout and setup work be closely controlled so that accuracy is obtained in setups so that a given procedure can be properly applied. Many of the economic advantages of good welding procedures are lost due to the poor set-up and improper preparation of materials.

### Need Good Inspectors

The Quality Control Department should have inspectors familiar with Code and specification requirements and with a practical knowledge of the factors affecting the quality of the weldment. The inspector should possess the abiilty to intelligently challenge the quality of a weld or a procedure and not confine the application of his talents to the observance of an obvious and trivial defect. He should periodically observe application of a welding procedure to insure that the specification is being fulfilled.

Welding procedures are preferably developed in the laboratory. A welding technician must be


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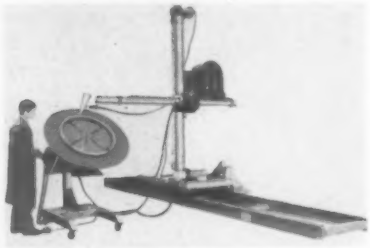

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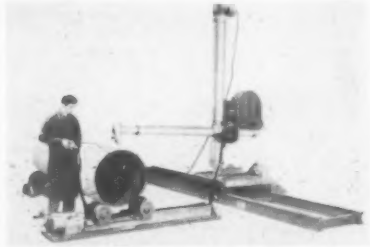

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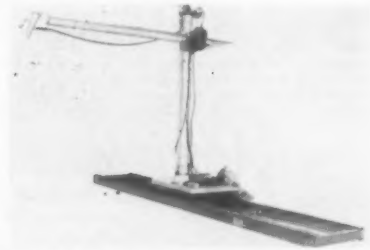

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available to follow up in the shop on such matters as qualification, welding materials, application of procedures and other specific details of a technical nature. This relieves the supervisor who is usually burdened with other management details.

Shop management for better welding requires preventive maintenance to keep equipment in top operating condition. Automatic welding machines in particular have a considerable amount of control equipment that must be kept in proper adjustment and cleaned and lubricated regularly. Welding machines must be cleaned and kept in repair. Motor generator sets must be lubricated and brushes and commutators kept in proper condition. It is important that welding equipment receive the same degree of preventive maintenance that any machine tool equipment receives if efficient and economical operations are to be realized.

## Summary

The sum and substance of this approach to "Shop Management for Better Welding" is that few problems exist here that do not exist in related forms for any manufacturing shop. In fact there is probably more relationship between the best management for a small machine shop or foundry and a small production welding shop than there is between a small and a large welding shop. There is one salient fact which applies to management of any manufacturing organization — management personnel must study and know the processes used in order to be capable of the application of good management principles for operational control. It is also essential that good labor relations — good human relations — be practiced by shop management. This very often creates a desire on the part of shop personnel

to produce good quality work. The end result, of course, reflecting good management.

**For Valuable Reference Material Available At No Charge See Page 28.**

## Valley Welding Supply Holds Open House

An open house and Welderama was held recently by Valley Welding Supply, Inc. to mark a move to

new and larger quarters at 1828 West Wisconsin Ave., Appleton, Wis. Eight of the company's suppliers exhibited and demonstrated welding equipment and accessories to over 375 persons who attended, according to William T. Hart, president.

Exhibitors included Alloy Rods Co., National Cylinder Gas Co., Miller Electric Mfg. Co., A. O. Smith Corp., American Manganese Steel Division of American Brake Shoe Co., Bay State Abrasive Products Co., Heath Engineering Co. and Aronson Machine Co.

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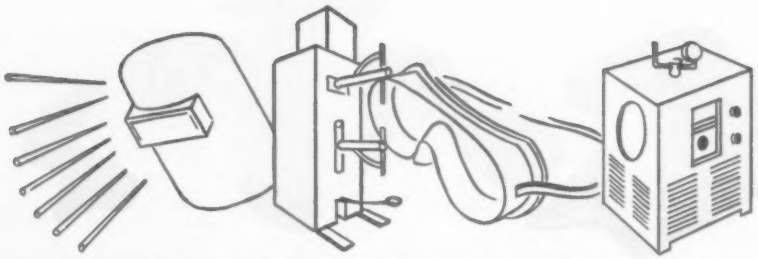

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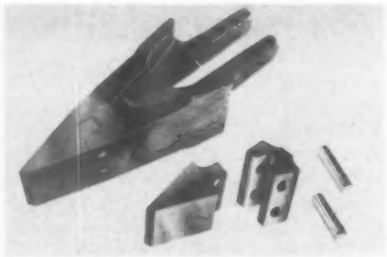

## Replaceable Digger Teeth with Weld-On Adapter

Completely new design principles have been used in Bulldog replaceable digger teeth for shovel dippers, back hoe, dragline, clamshell and loader buckets. Just introduced by Allied Steel & Tractor Products, digger tooth has only three parts: a universal weld-on adapter that is attached by using the old tooth as a base, a replaceable tip and two positive lock pins for securing tips to adapter.

Digger teeth are attached by burning off old tooth to adapter size, welding on adapter and securing replaceable tip to adapter by tapping pins in place with a hammer.

Manufacturer states that using old tooth as a base eliminates expense of a conventional adapter or new tooth and saves up to 65 percent on maintenance costs.

Adapters are made in 15 different widths from 2¼ to 7-inches.

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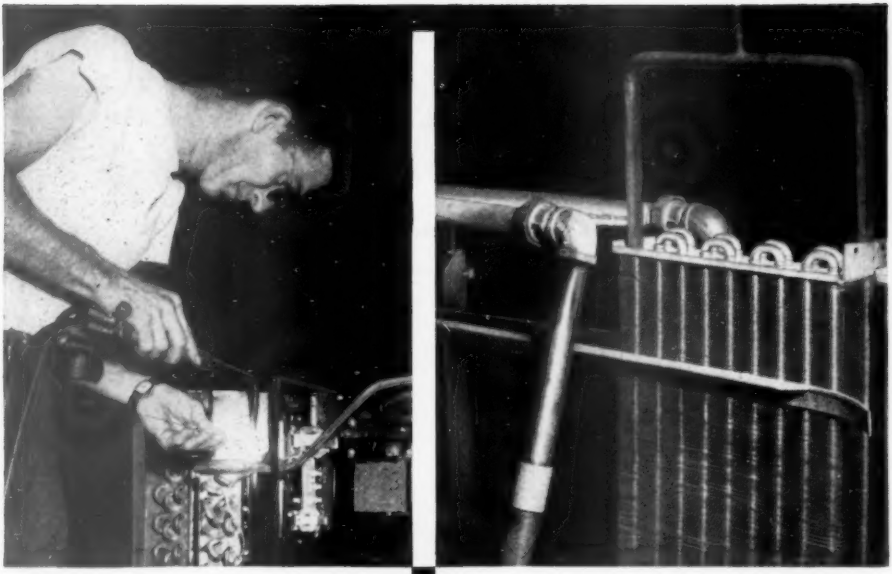

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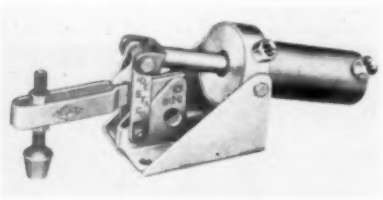
## Air-Operated Toggle Clamps

A new air-operated toggle clamp has been introduced by Detroit Stamping Co. Known as "Clamp-omatic," new Model 810 is said to provide positive, split-second clamping in multiple or single unit use. Being only 12-inches long, 5⅜-inches high and 3¼-inches wide, it requires less space than other clamps of this type.

Model 810 is available in two styles: Model 810-U, with U-bar for vertical



and lateral adjustment of pressure spindle (as pictured) and Model 810-S with solid bar and bolt retainer.

Double-acting air cylinder has 1½-inch bore with stroke of 2¼-inches and is fitted with two cylinder restrictor fittings to assure smooth, cushioned clamping action.

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Flux is a smooth, creamy paste that does not separate or crystallize. Where a thinner consistency is required, it may be diluted with water. It has a melting point below 1200°F and is recommended for brazing applications involving temperatures between 1600° and 2200°F.

Within recommended temperature limits, flux will not boil or run off. Its cleaning properties enable it to dissolve or remove from stainless steels the oxides of chromium, aluminum and titanium.

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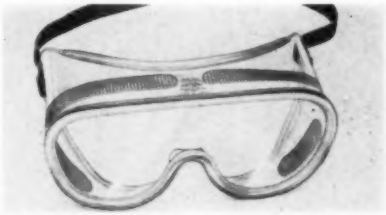

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Airflow plastic eyeshield made by United States Safety Service Co. feature a non-corrosive nickeled 20 mesh ventilating screen that is over 10-inches long. This increases air circulation and reduces area of air traps, giving cool, fog-free ventilation.

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Manufacturer is Despatch Oven Co.

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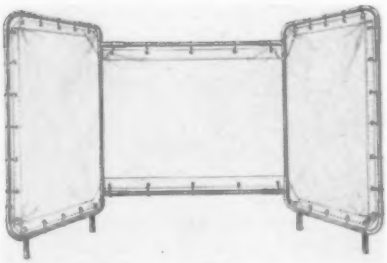

## Lightweight Portable Screen

A new lightweight portable screen has just been placed on the market by the Special Products Division of Singer Glove Mfg. Co.

Made of rust-proof tubular steel for quick assembly and portability, screen is said to fold flat and compact. Can be used as a shield for welding or machine protection, or with special platform legs available, as a straight-line wall.

**Circle No. 176 on Reader Service Card.**

USE THE READER SERVICE CARD FOR VALUABLE REFERENCE DATA

## Portable Electric Drill

Designed to meet the need for a moderate priced general service portable electric ¼-inch drill, the Standard Holgun introduced by Black & Decker Mfg. Co. has capacity for use wherever a professional drill is needed for jobs not requiring continuous, assembly line production.

Unit is driven by powerful motor and is equipped with anti-friction ball bearings that are grease-sealed for life. Tool weighs only 3¼ pounds.

**Circle No. 177 on Reader Service Card.**

## Ram-Type Manipulator

Several important modifications in its line of automatic ram-type welding head manipulators has been announced by C. B. Herrick Mfg. Corp. Both ram travel and travel of entire unit on track is controlled by electronic variable speed drive unit providing speed range of 5 to 100 ipm (or any desired 20:1 ratio). Dynamic braking stops ram instantly.

Special vee wheels guide lateral and vertical travel on SAE 4150 vee ways.

Easier manual rotation of 360° is within heavy cast base. Positive lock holds column and ram firmly in working position.

Precision machined railroad rail sections assure smooth travel on track.

**Circle No. 237 on Reader Service Card.**

## Speedy Surfacing Electrode

A contact-type electrode for high speed hard surfacing applications to resist extreme impact and moderate abrasion has been introduced by Marquette Mfg. Co. The No. 285 Hard-Rod is an austenitic chrome, powdered iron coated electrode which has a deposited hardness of 285-320 Brinnell and work hardens to 485-550 Brinell.

It is said to provide smooth arc on both AC and DC welding equipment, using straight or reverse polarity. Low spatter loss, excellent slag removal and smooth, low contour bead are said to be other important performance characteristics of the electrode.

**Circle No. 179 on Reader Service Card.**

# Production line D-C welder?

## Is there any other?

Is there any other welder that compares with the *exclusive* advantages offered by the Westinghouse RA d-c welder? Such outstanding advantages as . . .

An exclusive 100% duty-cycle arc drive to prevent sticking and pop-outs at all settings that gives a hot start for easy starting.

Longer welder life—used indoors or out—because the windings are double-dipped and baked in silicon-fortified Bondite . . . because the exclusive baked-on enamel finish on Bonderized steel assures weatherproofing.

"Wide-amp control" far exceeds NEMA Standards in both the high and low ranges—another exclusive. Arc stability and balanced load with Westinghouse three-phase selenium rectifiers—originated by Westinghouse.

"Is there any other?" Compare—and prove to yourself the superiority of the Westinghouse RA. J-21951

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☐ Please send full information on Westinghouse RA d-c welder.

☐ Have welding specialist call.

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Company_____

Street & No._____

City_____ State_____

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MR. WELDING SUPERINTENDENT

Tipaloy

Tipaloy #130* is the answer to users who know the difference between PRICE and COST when it comes to Resistance Welding electrodes.

You want all the welds you can get for the least money.

Insist on TIPALOY "Straight-Line" Tips.

Tipaloy electrodes are precision made from Tipaloy's own patented alloy, assuring you satisfaction.

**30% TO 100% LONGER TIP LIFE**
Resulting in longer runs without shutdown for maintenance AND more welds per electrode.

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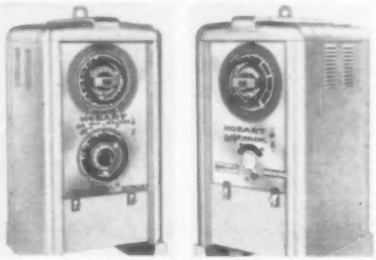
*RWMA Class #2 Alloy

Tipaloy 1435 EAST MILWAUKEE INC. DETROIT 11, MICHIGAN

**Circle No. 149 on Reader Service Card.**

## Two New Arc Welders

Two new arc welders have been introduced by Hobart Bros. Co.



The first is an AC-DC and inert gas arc welder (left) which is rated 200 amperes, 40 volts and has a current range of 10 to 300 amps, AC or DC. Features include selector switch which permits operator to choose AC, DC straight or DC reverse current.

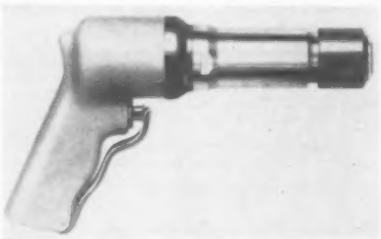
Second welder (right) is a new rectifier unit with "Diverter Path" control that is available in 300 an 400 amp models. Features include three coarse current adjustments with rheostat control for fine current adjustments.

Both units feature new case with easily removable side panels, recessed control panel, magnetic line contactor and removable rheostat.

**Circle No. 97 for Rectifier.**
**Circle No. 180 for AC-DC.**

## Heavy Duty Air Hammer

The new Model AD 500 heavy duty air hammer introduced by Superior Pneumatic & Mfg. Co., has a bigger hammer and a bigger piston to deliver more punch for heavy cutting, chipping, chiseling or grooving. Though unit delivers

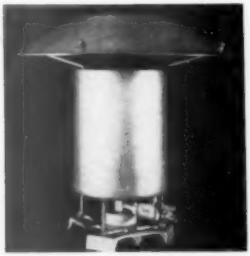


2200 blows per minute at less than 80 psi, it weigns under four pounds and is said to be extremely maneuverable. A patented safety chuck locks various tools used with hammer in six different positions.

**Circle No. 144 on Reader Service Card.**

## L-P Salamanders

Weldit, Inc., has introduced their latest line of L-P salamanders. Among improvements are a slight change in shape of the "Flame Dome" and the addition on the underside of the Dome of the new "Thermo-Disc." Made of malleable iron



and located directly above flame, "Thermo-Disc" intensifies heat and adds to efficiency of radiation. "Flame Dome" provides for 360° heat distribution.

Salamanders are available in three models: No. 800, high pressure floor type; No. 1850, high pressure tank top and No. 900, low pressure floor type with automatic safety shut-off.

**Circle No. 160 on Reader Service Card.**

USE THE READER SERVICE CARD FOR VALUABLE REFERENCE DATA

## Aluminum Electrode with Extruded Coating

An aluminum electrode with a pressure extruded concentric coating has been introduced by Eutectic Welding Alloys Corp. Patented extruded coating on "Low Amp" EutecTrode 2101 (DC) was developed to eliminate explosive spatter which makes conventional hand-dipped aluminum electrodes difficult to apply. Coating eliminates short circuiting, erratic arc action and uneven transfer of filler metal. Tests show electrode has stable arc even when applied without preheat.

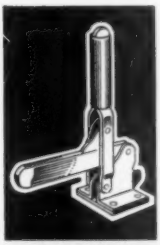
Electrode produces joints with ultimate tensile strengths up to 34,000 psi. It is adapted for use on heat treated aluminum such as 24ST and 17ST. Deposits are said to be smooth, dense and free of porosity. Slag coverage is full and slag removes easily with indirect impact.

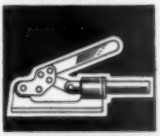
Electrode will be available in four diameters.

**Circle No. 203 on Reader Service Card.**


WESPO

TOGGLE CLAMPS





**Hardened steel bushings and pins provide for longer wear — eliminate elongated holes and pin shearing.**

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***39 Sizes Available***

WESPO TOGGLE CLAMPS are engineered and constructed for positive holding and light, medium and heavy clamping.

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DETROIT 19, MICHIGAN

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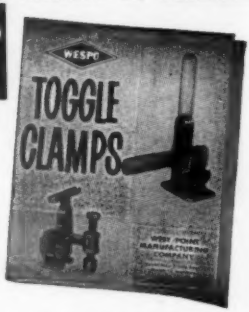


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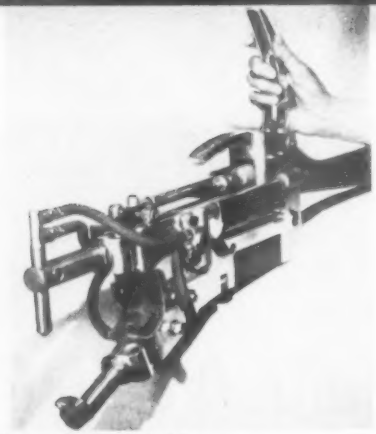


## New Spot Welder

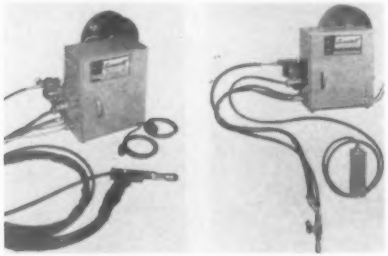
A new spot welder model introduced by Aro Spot Welders, division of Guthery Machine Tool Corp. incorporates all the important advantages of other Aro models, including extremely high welding current for its size, easy one-hand operation and easily adjustable spring pressure.

In addition, the Model 192 incorporates a convenient lever that lowers and raises bottom arm. This device is said to speed up production.

**Circle No. 183 on Reader Service Card.**

## Automatic Welding Equipment

A new line of semi-automatic and fully automatic welding equipment for $CO_2$ and inert gas metal arc welding has been introduced by National Cylinder Gas Co. New equipment is designed for



single pass horizontal and flat position welding, using a constant voltage type DC power source. It consists of welding control and electrode drive unit, welding gun or automatic welding torch and interconecting gas and water cable assemblies.

Four "Sureweld" SA outfits are available: SA-1 for semi-automatic welding with a gun, SA-10 for full automatic

pays for itself in a week

The Welder's mate . . . . . Use it for holding pipes, bars, angles, plates or sheets, on all classes of welding. Save a pair of hands, time and money.

MAGNETIC HOLDER

Eclipse

*For descriptive literature and address of sales agent in your area, write to*

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37/39 PEARL STREET, NEW YORK 4.

PH 19

**Circle No. 126 on Reader Service Card.**

operation where electrode torch is to be carriage-mounted; SA-20 for automatic welding of long joints where workpiece is moved or rotated and SA-20 (a combination outfit) for semi-automatic and automatic welding and for arc-spot and plug welding.

**Circle No. 231 on Reader Service Card.**

## Pipe Welding Electrode

A new E-6010 electrode suitable for all E-6010 application, but especially designed for pipe welding has been introduced by Lincoln Electric Co. Pipe welding, especially on root passes with a "vertical up" technique at low currents, demands exceptionally smooth arc operation, deep penetration and good bead wash-in. In addition to having these characteristics, electrode is also said to provide minimum slag interference and a flat-shaped bead in an even deposit from which slag is easily removed. Electrode is available in 1/8-inch and 5/32-inch diameters.

**Circle No. 185 on Reader Service Card.**

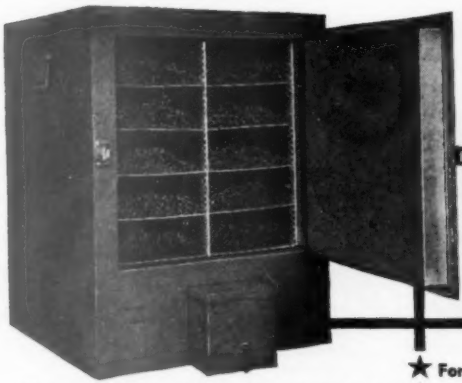
## New Fire Extinguisher

A new stored-pressure water fire extinguisher has been introduced by Ansul Chemical Co. Extinguisher has a 2½-gallon capacity. Underwriters' Laboratories has classified it 2-A, highest rating given to extinguishers of this capacity for use on wood, paper and rag fires.

An important feature of new unit is shut - off control. Operator is able to turn off water at will, reducing water damage to a minimum and allowing most efficient use of water contained in unit.

Unit is available in three different shells: stainless steel, brass and chromium-plated brass.

**Circle No. 186 on Reader Service Card.**

KILL moisture absorption with DESPATCH ROD DRYING OVENS

It's an accepted fact that certain electrodes in storage tend to gather moisture and $CO_2$. This applies to low-hydrogen, stainless steel and non-ferrous electrodes. The amount of moisture is related not only to the percent of relative humidity, but also to the length of time that electrodes are stored. Despatch "WRD" Welding Rod Ovens provide lots of storage room in 10 spacious compartments and do a thorough, steady, dependable dehydrating job. *Specifications:* Outside dimensions—18"x19"x18". Max. Temp. 550° F; 250 lbs. rod capacity. *Write for Bulletin.*

★ For all types of baking, drying and ageing
★ Operator works steadily—rework time cut
★ Automatically controlled—set it and forget it
★ Mesh shelving for total heat circulation
★ Conveniently portable for entire shop use

DESPATCH OVEN CO. Established in 1902
380 DESPATCH BLDG. MINNEAPOLIS 14, MINN.

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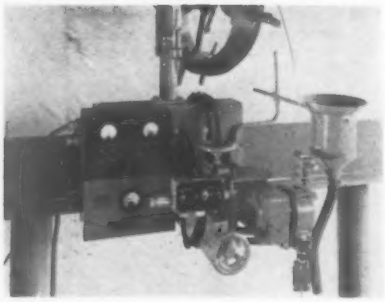

## Submerged Arc Heads

A new line of welding heads and assemblies for submerged arc welding has been announced by Linde Air Products Co. New models are designated UEH-1, UEH-2 and USH-2 welding heads.

UEH-1 welding assembly is designed for heavy duty operation. It uses an electronic voltage control and feeds wire up to 5/16-inch diameter at currents up to 2,000 amperes.

UEH-2 and USH-2 are of the same general construction but somewhat smaller. The former uses an electronic speed control for constant potential welding, while the latter uses the standard arc voltage control. Both accommodate wire up to 1/4-inch and currents up to 1,200 amps.

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MEETS EVERY STANDARD ACROSS THE WORLD!

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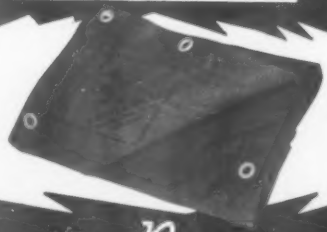
CONFINE YOUR DANGER!



USE Reeves
FIRE CHIEF TREATED
WELDING CURTAINS

- close woven canvas
- weighs 10 ounces per square yard before treatment
- impregnated with Hooper's Fire Chief treatment under their patent
- Underwriters Laboratory approved

The perfect protective curtain for all your dangerous work.

A. SMITH & SON, INC.
"IF IT'S MADE OF CANVAS, WE MAKE IT"
Green & Ridge Ave. Philadelphia 23, Pa.

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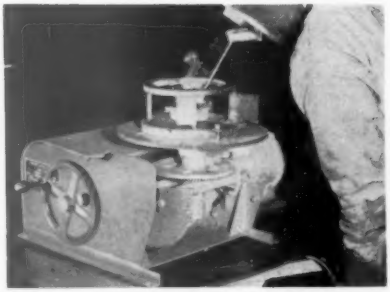

## Bench Model Positioner

A power operated bench model welding positioner has been introduced by Worthington Corp. The Model 1P unit has variable speed driven table rotation and accurate worm-and-segment hand tilt. Disengaging clutch provides free wheeling whenever desired.

Work may be quickly clamped to 16-inch circular top through the four 9/16-inch radial slots. Handwheel operates worm gear so work may be tilted accurately through 135°.

Table is self-locking at any degree of tilt and is rotated by ½hp, single-phase reversible motor. Hydraulic variable speed drive permits stepless speed range adjustment from .0 to 5 rpm.

Load capacity is 100 pounds with center of gravity 3-inches from table top, 3-inch eccentricity.

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# Let's Get Down To Facts About CLAIMS—

Yes, we could run a full page telling you why our Products are better, but we prefer to have

## HI-AMP

**ELECTRODE HOLDERS**

prove their advantages by actual test with others—that's why we say, ask your Dealer to demonstrate a HI-AMP and you'll "see" why Welders everywhere prefer it.

**LENCO, Inc.**

*(Formerly Wagner Mfg. Co., Inc.)*

**JACKSON, MISSOURI**

Weld with HI-AMP

FOR **MAXIMUM PROTECTION**

**FROM WELDING SPATTER**

**SPECIFY "GARDWELL" SAFETY CURTAINS**

GARDWELL Safety curtains of Fire Resistant Duck are widely used in welding shops. Specially treated to resist oil, water and mildew, they are made to order in any size—Furnished with grommets or hemmed for hanging. Also available in Asbestos or Glass Fiber.

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*Safety* **CLOTHING & EQUIPMENT** *Co.*

**1990 EAST 69th ST. • CLEVELAND 3, OHIO**

**Circle No. 138 on Reader Service Card.**

## Small Polishing Wheels

Designed for polishing metal with portable hand tools, a new line of small "PG" wheels has been introduced by Minnesota Mining & Mfg. Co. Wheels which have same basic design as company's large polishing and grinding wheels introduced last fall, are composed of die-cut pieces of coated abrasive cloth, bonded with resin and locked into a hub. Wheels are said to be ideal for polishing of stainless and sheet metal welds.

Wheels can be used on portable grinders, flexible shaft equipment or small bench-type grinders. They are available in a wide range of diameters and face widths in grits ranging from 50 through 320.

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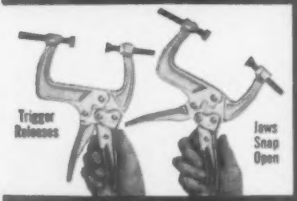
## Automatic Welding Package

Designed for automatic welding of circular shapes, such as rollers, idlers, sheaves and crusher rolls, a complete and versatile "packaged unit" has been


NOW... for WELDERS...
ANOTHER DE-STA-CO FIRST...
3 New Portable Clamps with
TRIGGER-RELEASE




MODEL 484

Instant easy action enables operator to clamp and release the tool with one hand . . . Clamping Pressures up to 1200 lbs. . . . Especially Rugged Construction for extremely long wear!

Two Other Models...

MODEL 482

MODEL 486

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DE-STA-CO DETROIT STAMPING COMPANY
World's FIRST line of TOGGLE CLAMPS
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LATEST DEVELOPMENT IN WHEEL GUARDS...FOR PORTABLE GRINDERS WHEN USING FLARING CUP AND STRAIGHT CUP WHEELS...

MORRISON CUP GUARDS

MAXIMUM STRENGTH AND SAFETY
—Allows Full View of Work

| Part | Size | List Price | |
|---|---|---|---|
| C-6 | 6/4¾ | $4.90 | FLARING CUP |
| C-5A | 5/4 | 4.80 | |
| C-5B | 5/3¾ | 4.80 | |
| C-4 | 4/3 | 4.70 | |
| CS-6 | 6 | 4.90 | STRAIGHT CUP |
| CS-5 | 5 | 4.80 | |
| CS-4 | 4 | 4.70 | |

Adaptor for straight bushed wheel — list price $4.75

SEE YOUR GRINDING WHEEL SUPPLIER

MORRISON PRODUCTS INC.
16816 Waterloo Road • Cleveland 10, Ohio

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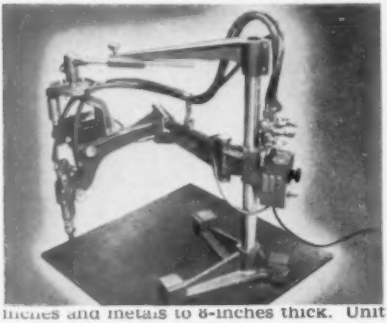
introduced by Sight Feed Generator Co.

The Rexarc RP-43 unit has many features. These include an automatic head which operates on higher than normal welding voltage, a high frequency generator which assures automatic start of arc, a varidrive and motor for rotation and variable speed rotation which give 10 to 1 speed variation, and 500 amp AC transformer welder with power factor correction.

**Circle No. 241 on Reader Service Card.**

## Portable Shape Cutter

A new, lightweight portable shape cutting machine introduced by Victor Equipment Co. cuts circles to 19½-inches diameter, rectangles to 12-inches by 35-



inches and metals to 8-inches thick. Unit weighs only 36 pounds.

Unit has magnetized feet which use stock being cut as working base, Model DC-2000 cuts to tolerances of plus or minus 1/64-inch and features quick interchange of templates. Template follower has powerful, permanent magnet.

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**Circle No. 63 on Reader Service Card.**


**WOOD HANDLE OR STEEL HANDLE—**

**Atlas Gives You The Best!**

For welders who prefer wood handle Tomahawks, Atlas W-H models are tops. "Tough" *induction hardened* heads, long, thin chipping blades assure maximum life.

**Atlas Welding Accessories Inc.**

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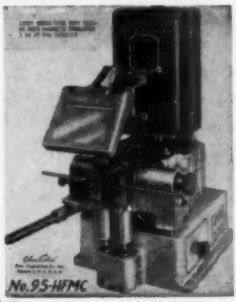
**INDEXING TURNTABLES BUTT WELDERS SPOT WELDERS**

CAMS




GENEVA GEARS

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# POSITIONEERING

## PART 5

### Welding Processes and How They Affect Positioning of Weldments

by CHARLES N. ARONSON, President, Aronson Machine Co.

WELDING speed is the rate of travel of the weld and is always given in inches per minute. For brevity, inches per minute is shown as: In. Per Min., In./Min., "/Min., I.P.M. or, as we prefer, IPM. Welding speed varies greatly with various welding processes. Some are inherently slower than others. Each has a wide range depending on the joint to be welded.

**Downhand Welding Speeds Production**

For example, the most familiar process, coated electrode manual arc welding, may have a weld speed of only a few inches per minute, as low as 4 IPM if the job is vertical up. Or, if that same job is *positioned* for "downhand" welding in the flat it might be speeded up to 12 IPM. And if *positioned* a little more precisely with a 10° downhill slope it would be speeded up still more, to 19 IPM.

**New, Speedier Electrodes**

Between one electrode type and another identical welds might have a slow 8 IPM or a fast 25 IPM. With the introduction of newer, faster electrodes the speed of welding has steadily increased over the years and can be expected to continue to increase in the future. So, the range of speeds of this one process is quite wide.

Probably the next most familiar process is the submerged arc which uses a granular flux and is applicable to either manual or mechanical welding. In this process there are jobs being done which employ deep penetration and high deposition at quite slow travel rates but high overall joint speed. This means that the procedure accomplishes in one pass what was done previously in several. Thus, even 5 IPM for a complete joint is much faster than several passes done at higher speeds. At the other end of the scale, welds are being made at 50 IPM and faster with this same basic welding process.

**Keep Up With New Processes**

Every year new processes are being introduced. One should try to keep abreast so as to avoid being overly surprised when dealing with speeds as high as 100 IPM and up. Reading any of the several very good trade magazines will keep you informed. But the only essential knowledge of welding processes as regards welding speed in positioning is the IPM at which the job will be done.

Knowing there is a fairly wide

range, one should take into account that, though the job may be planned for 15 IPM, it is not at all unlikely that the welding speed may have to be 25 or 30 IPM before the job is over. Or, it may change from several passes to a single pass, and the weld speed slowed to 7 or 8 IPM for that same job. Thus, selection of the positioner should be made with an allowance above and below the planned weld speed, and still not sacrifice precision at the weld speed planned for.

Current used in welding is expressed in amperes or amps. An ampere is a unit measure of flow. Likening it to water, voltage is the water pressure in pounds per square inch and amperage is the water flow in gallons per minute. A water pipe of given size will afford a certain flow at a certain pressure. With a set pressure, to increase flow we must increase the size of the pipe. In positioning it is the flow — the amps — with which we are concerned.

## Compare Electricity to Water

To make this aspect stick in your mind, let's continue with the water simile. Older houses were built before the advent of automatic washers. We all know this modern labor-saving device uses a lot of water in getting a lot of work done in a short time. The old house was built with pipe of a given size which was entirely adequate for hand washing clothes. The town hasn't increased the water pressure in its mains. The automatic washer has a time device which opens a valve for a certain period during which time a certain amount of water is supposed to be introduced into the tub. If these old pipes are too small, the automatic washer just isn't going to get enough water in the time allotted, and the job will be something less than 100 percent satisfactory.

## Increase Welding Current

In recent times, welding processes have been improved and new ones brought out, each time with an end result of faster welding speed. One of the ways to obtain faster welds is to increase weld current. Where previously 300 amps was considered high, today 600 amps is fairly commonplace, and some automatic processes call for 1200 amps and more. Also, to increase production large manual jobs require simultaneous welding by several operators, all using high current.

In effect, the positioner that could conduct ground circuit current a few years ago probably won't handle modern current conduction requirements. Also, it is quite possible that a certain positioner can handle a job in all respects except in the matter of affording adequate ground current conduction. It might be necessary to go to a larger size positioner, or even a different type, for the one feature of greater current conduction capacity.

High frequency current is an innovation of some processes to improve arc stability. One need not know exactly what high frequency is or what it does for the weld. He should know, however, about a Gremlin some high frequency applications have turned up.

## Path of Least Resistance

Most electric current will find the path of least resistance and follow it. It is claimed by some that this does not hold true of high frequency, which is said to wander toward some other attractions. It is also claimed to have caused motor failures in some associated machines, such as in the positioner.

Experience has shown that high frequency current can be contained if an exceptionally good path is provided in the positioner from

**"Positioneering is the science of positioning a workpiece as a means of improving quality, increasing production and lowering manufacturing costs."**

weldment to ground conductor attachment. Specifically, the addition of a built-in mercury ground having a pool of mercury surrounding the spindle and in contact with a massive trunnion or bearing housing has in every case eliminated high frequency problems.

Heat is an important factor in welding processes. Heat also has a real affect on selection of positioners. Heat, which might be better called temperature, should not be confused with the word some operators erroneously use when they mean current. Heat comes from several sources and all affect positioning simply as to whether some part or all of the positioner is operating at high temperature or low.

### Arc Heats Weldments

Heat from the arc raises the temperature of the weldment in proportion to the length of time the weldment undergoes welding and the intensity (current) of the arc.

Some weldments are under the arc a very short time and at low amperage, so weldment hardly heats up and the positioner is in contact with the weldment only a short time.

Other weldments may call for a weld around and around, and at high current, so that the weldment actually gets red hot by the time it is removed. In this case, the positioner might well be warmed up a great deal at the end of the working day. And, more critically, a part of the positioner nearest the weldment might reach very high temperatures.

### Weldment Heats Up Positioner

Preheat welding procedures call for the weldment to be heated up before welding, as a step toward reducing shrinkage, warpage and weld cracking. Again, the weldment might be red hot when mounted to the positioner and with an intense arc might not cool at all. Thus, the positioner would be operated in an atmosphere of high temperature by reason of contact with the weldment.

Atmospheric temperature affects the positioner in that the job may be done all year long in a weld shop where there is inadequate temperature control; in summer temperature is 120°F and in winter is as low as below freezing. Or the installation may actually be out of doors in all weather, from 100° above to 20° below zero. The positioner is then subjected to a wide range of temperatures due to weather plus temperature range due to welding.

The affect of temperature on positioner selection is generally slight because most welding processes have side affects well within standard machine capabilities. This is all the more reason to be cautious and to check every application for adverse side effects.

### Lubricants Are Important

Machines have components that require lubrication and today, lubricants are available to handle a range of about zero degrees to well over 100°. An unusual application could require special attention to lubricants, even beyond the expected wider range positioners generally satisfy. A lubricant suitable for 5° above might become too stiff at 15° below, for example.

In welding positioners of the common gear-driven type it is ord-

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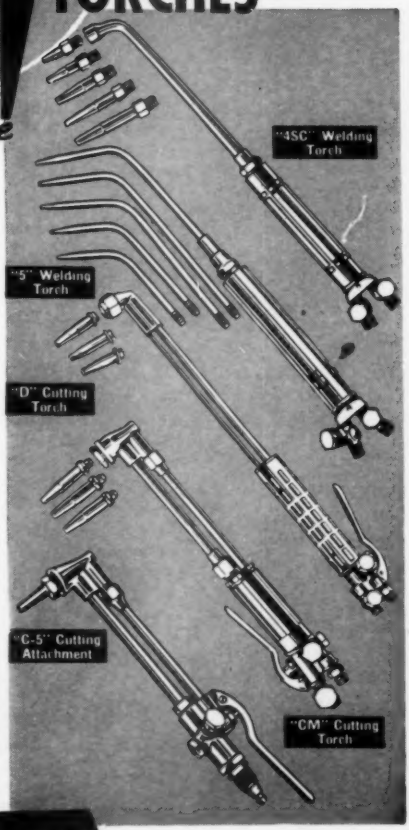


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inary procedure for the weldment to be in contact with the table top, and for the weldment and the weld arc to considerably raise the temperature of the table and the spindle. A manufacturer of this type of positioner should always use a spindle bearing lubricant that does not melt at any temperature.

### Protect Spindle from Heat

For the extreme cases where there is preheat or the weldment becomes red hot or nearly so, precautions must be taken, such as spacing the weldment up off the table to allow some passage of cooling air between weldment and table top. Even if the bearing and lubricant will withstand the extreme heat, metal of the spindle expands enough to lengthen the spindle and tends to loosen the bearing adjustment, in some cases enough to reduce the precision of table rotation.

### Transporting Gas Is Problem

Gas transport is a factor with some welding processes and procedures. Gas to be transported may be for shielding the arc or for heating the weldment before, during and after welding. The transportation of the gas concerns that portion of its journey which might be restricted by elements of the positioner, such as the spindle and table.

To provide an efficient procedure it is often desirable to conduct the shielding gas up through the spindle to the top of the table, coming at the arc from behind the weldment where there will be less interference with the operator, rather than from the top where it might block out a part of the weldment and generally be in the way.

In many welding jobs it is necessary to heat the weldment during the weld cycle and to slowly bring its temperature down while still held in the fixture, after the weld is completed. To accomplish this, fixture has a built-in gas ring which is fed through a hose passing up through a hollow spindle.

There are many welding processes which use gas shielding. It is best to check each job application to make sure the positioner wouldn't best serve if it had a hollow spindle.

### What Is Duty Cycle

A machine is composed of structural parts affording support and working parts affording action. Working parts are subjected to wear and have a life expectancy in hours, the result of load and speed. Duty cycle is simply how many of those hours of life are to be used up each working day.

An anti-friction bearing (rolling not sliding) is a good example. A certain bearing with a speed of 500 revolutions per minute (rpm) will support a load of 1245 pounds for 3000 hours of life. At 50 rpm it will support twice the load for the same life, or the same load for twice the life. At 5000 rpm it will support half the load for the same life or the same load for half the life.

Using the bearing above, a duty cycle of 8 hours per day, 5 days per week, will give a life expectancy of 75 weeks, about a year and a half. This duty cycle could apply to something like the exhaust fan of a continuous duty spray booth where the fan was turned on at the start of the working day and turned off at the close. This same bearing in a positioner would have a much longer life span.

### Intermittent Duty Cycle

A positioner's anticipated duty cycle is intermittent. It takes a cer-

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tain amount of time to run the weld and generally much longer time for loading and unloading. An average ratio would be 3 minutes weld and 12 minutes loading and unloading. This would run off one part every 15 minutes, 4 an hour, 32 a day, and the positioner would run only 1.6 hours per day. Our example bearing then gets only 8 hours running each week and will last five times as long as it did in the fan under the same conditions of load and speed.

There is no other class of machinery with as wide range of duty cycle as positioners. Positioner duty cycle is so wide because weldments which can be applied to one model and size positioner are so varied. A 1000 pound weldment can be very large, if it is rather hollow, or very small if it is quite solid. A large diameter weldment may have a small diameter boss as its only weld, in which case the production rate and duty cycle is very high. Or the same weight weldment may be of the preheat, weld heat, postheat procedure and only two run off each day with actual positioner running time but a few minutes each cycle.

## Positioner Has Varied Role

In the job shop a set-up is made for short runs, while a production shop set-up may be for thousands of the same weldment.

It is expected that a positioner in a job shop will be idle a large part of the time, and when it is working it will be applied to weldments weighing only a fraction of the rated load capacity up to weldments weighing even more than rating.

A mass production application may be such that the positioner will be expected to last only as long as the production run; or, be applied to another similar mass production

run as soon as the first is completed.

### You Can't Satisfy Everyone

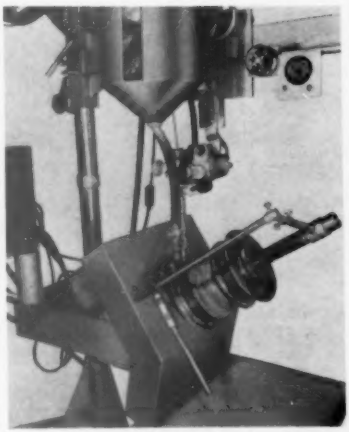
The One Hoss Shay is fiction. It had no part weaker than any other part. It lasted a hundred years and a day. And when it went, it went all at once, and left but a small heap of dust where it stood so grandly. It was not a competitive production model. Its creator must have been a berserk manufacturer. That doesn't mean he was a manufacturer of berserks, but simply one who went berserk trying to satisfy all the demands of his field and still not go broke.

So it is with positioners. To design and build one that will satisfy all demands put upon it by the severest application would mean a production cost prohibiting a competitive selling price. It would be unfair to the many average users to expect them to pay for capacities their work will never demand. The user with a severe application cannot expect to obtain satisfaction from a machine selling at the lowest price for the required load rating.

### Allowances Must Be Made

Allowances must be made for each application's particular characteristics. The Positioneer must recognize these factors and select accordingly. If production rate is average, then an average good positioner will prove satisfactory. If rate is high, the next larger size positioner will provide necessary life expectancy. Initial outlay will be more, but the trouble-free production and long life will make for a true economical high production rate.

*Next month: Positioneering Data Sheets*

**RP-43 for welding circular shapes** such as rollers, idlers, sheaves, cones, crusher mantles — many other circular weldments.

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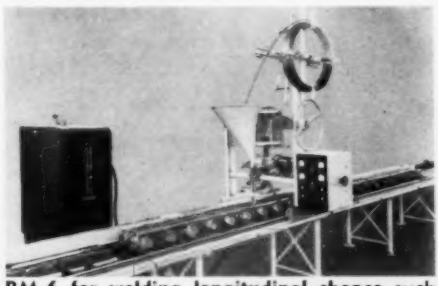

**RM-6 for welding longitudinal shapes** such as crawler type tractor rails, box beams, structural shapes—countless other applications.

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**COMPLETE LINE OF SAFETY EQUIPMENT FOR HEAD, FACE AND EYE PROTECTION** is subject of Catalog No. 33 published by Sellstrom Mfg. Company. Fifty-four full pages are included in the catalog which contains special alphabetical listing of hazard, occupation and trade name with recommended items of goggles, helmets, face shields and respirators. **Circle No. 214 on Card.**

**HOW TO CUT WELD CLEANING TIME BY 85 PERCENT** is explained in literature from G. W. Smith & Sons, Inc. Described are two anti-spatter and anti-rust compounds. Money-back trial offer is explained. **Circle No. 142 on Reader Service Card.**

**DUST COLLECTORS OF EVERY TYPE** are described and illustrated in a new 16-page catalog issued by Torit Mfg. Co. Featured is complete line of cabinet cloth filter and cycle separator type dust collectors. Photographs show products in actual use, line drawings illustrate specifications and cutaway drawings show operational procedure. **Circle No. 215 on Reader Service Card.**

**HARDSURFACING PRODUCTS FOR EVERY USE** are the subject of complete catalog offered by Rankin Mfg. Company. Described in detail is new shortcut in which metallic coated hardsurfacing materials are deposited with an intermittent pass. **Circle No. 133 on Card.**

**PRECISION SURFACE EQUIPMENT** for weld shop, tool room, pattern shop and precision set-up assembly and testing are included in Catalog 838-V available from Challenge Machinery Co. Complete information is given on angle plates, V-blocks, box parallels, universal right angle iron and various types of surface plate equipment. **Circle No. 221 on Reader Service Card.**

**WRENCHLESS-TYPE IRON BENDER,** suitable for bending rounds, pipe flats, squares, conduit and angle iron are described in loose-leaf bulletin No. 11612, of the Hossfeld Manufacturing Co. Illustrations show a wide range of applications. **Circle No. 98 on Reader Service Card.**

**EVERYTHING FOR CABLE CONNECTION** is cataloged in a new 4-page brochure from Chicago Tool and Engineering Co. Described and illustrated is the Palmgren line of cable connectors, replacement connectors and insulation hose. Also featured is a weld gage for calibration of butt and fillet welds. **Circle No. 217 on Reader Service Card.**

**LAYOUT LINES 100 TIMES BRIGHTER** than soapstone is the description of reflective marking material given in important folder available from Brite-Line Corporation. Known as Brite-Line, material comes in kit form and is said to go on easily and stay on. **Circle No. 68 on Card.**

**MAST-TYPE (10 x 12) AUTOMATIC WELDING HEAD MANIPULATOR** and how to use it is the story told in Bulletin R-1700-B18 from Worthington Corp. Illustrated 4-page brochure includes specifications, general description, special features and other important data. **Circle No. 219 on Reader Service Card.**

**IRON CONTENT OF STAINLESS STEEL WELDS** is easily measured with a new instrument introduced by Ferro Corp. Precision instrument is said to replace destructive laboratory analysis and make possible rapid, on-the-spot, non-destructive tests for iron content at various points along a weld. **Circle No. 87 on Reader Service Card.**

**DUPLICATED SHAPE CUTTING WITH LITTLE EFFORT** is possible according to colorful "loose-leaf" bulletin prepared by Victor Equipment Co. on two portable flame cutting machine models, VU-120 and DC-2000. How accurate production can be obtained with this equipment is explained. **Circle No. 216 on Reader Service Card.**

**COMPLETE LINE OF AUXILIARY WELDING EQUIPMENT** is featured in catalog offered by the Challenge Machinery Co. Described and illustrated are semi-steel welding table, cast iron work benches, checking tables, surface and bench plates. **Circle No. 222 on Service Card.**

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**COMBINATION MACHINES FOR PUNCHING, SHEARING AND COPING METALS** are featured in Catalog 80 offered by Webb Corporation. Colorful, illustrated 8-page folder describes five-in-one metalworking machine which punches, cuts, notches, shears and copes. **Circle No. 223 on Service Card.**

**EVERY TYPE OF AXLE FOR EVERY TYPE OF TRAILER** is featured in two bulletins available from Hammer Blow Tool Co. Bulletin 5607E describes and illustrates "Torq-Less Axles" in single and tandem assemblies. Bulletin 5608D covers single and tandem drop axle and straight axle assemblies. **Circle No. 91 on Reader Service Card.**

**A HOW-TO-DO-IT HANDBOOK ON SLING CHAINS** has been published by Columbus McKinnon Chain Corp. Thirty-two page Data Book No. 100 offers diagrams, charts and tables on standard and special styles of sling chains and attachments, and their sizes, weights and working load limits under many conditions of use. **Circle No. 224 on Reader Service Card.**

**ALUMINUM WELDING FITTINGS AND FLANGES** are described and illustrated in literature offered by Tube Turns. Listed are different sizes and types of newly introduced line. **Circle No. 225 on Reader Service Card.**

**ELECTRODE DRYING OVENS** are among the products featured in a colorful, illustrated brochure from Despatch Oven Co. Also featured in Bulletin 100 are redesigned models of laboratory and production ovens in the company's "V" series. Engineering, construction and control features are explained. **Circle No. 175 on Reader Service Card.**

**When heavy, unwieldy weldments like these diesel crank cases can be quickly swung into any position so that every weld is made downhand — that's efficient welding!**

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**INSTANT CURRENT MEASUREMENTS WITH TONG TEST AMMETERS** is the subject of an 8-page, illustrated folder from Columbia Electric Mfg. Co. Described and illustrated is AC-DC ammeter which is ideal for checking and measuring welding current. Various types of ammeters are illustrated and current ranges for each are given in amperes. **Circle No. 226 on Service Card.**

**ELECTRODE HOLDER, HALF THE WEIGHT OF A HELMET** is featured in an illustrated data sheet from Tweco Products Company on their Model AL-300 holder which weighs 13½ ounces. Replaceable components are listed. **Circle No. 227 on Reader Service Card.**

**IRON POWDERS FOR USE IN FLAME CUTTING AND ELECTRODE COATINGS** are among the electrolytic and reduced iron powders featured in Bulletin No. 2 from Plastics Metals Division of National-U.S. Radiator Corp. The 12-page bulletin lists many other commercial and industrial applications for the iron powders. **Circle No. 228 on Reader Service Card.**

**INDEXING TURNTABLES** are described in a new illustrated catalog just published by Eisler Engineering Co., Inc. Described are 150 different types of indexing turntables, rotating turntables, and turntables that can be set to any angle. **Circle No. 85 on Reader Service Card.**

**POWER-OPERATED BENCH POSITIONER** has many uses according to Worthington Corp. literature on their Model 1P unit. Capacities, specifications and suggested uses are described and illustrated in this useful folder. **Circle No. 229 on Reader Service Card.**

**COMPLETE LINE OF CYLINDER TRUCKS** is featured in catalog available from Welded Truck & Specialty Co. Described and illustrated are styles for all sizes and types of cylinders. **Circle No. 164 on Reader Service Card.**


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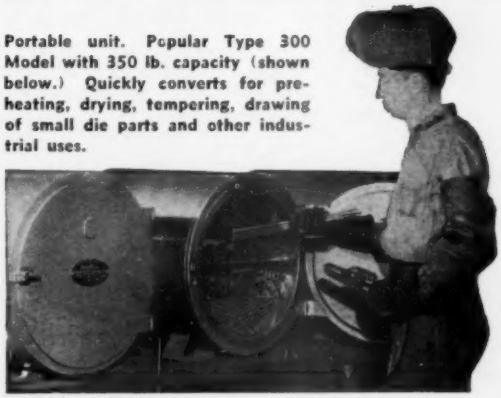

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**Circle No. 130 on Reader Service Card.**

**WELDER-POSITIONER PACKAGE** for automatically welding circular parts is described in illustrated literature from the Sight Feed Generator Co. Complete information is given on use of model RP-43 for welding rollers, sheaves, idlers and similar parts. **Circle No. 241 on Reader Service Card.**

**NEW AUTOMATIC WELDING EQUIPMENT** described in comprehensive booklet covering applications, specifications and operating characteristics. Offered by National Cylinder Gas Co., booklet shows how maximum versatility and economy can be obtained in $CO_2$ and inert-gas-metal-arc welding with new equipment. **Circle No. 231 on Reader Service Card.**

**HOW TO CHECK FOR PERFECT FILLETS** through use of the Banco Gauge is described in folder from Rapid-Flow Equipment Company. Low cost, easy-to-use features are covered. **Circle No. 136 on Reader Service Card.**

**PIPE WELDING LAYOUT TOOL** whch increases speed and efficiency of layout operations is described in literature from Contour Marker Corp. Booklet describes how tool can be used to layout pipe joints, mark center lines, align pipe and flange and mark any arc or circle. **Circle No. 77 on Reader Service Card.**

**HOW TO GET X-RAY QUALITY WELDS** is explained in informative data sheets published by Alloy Rods Company. Various welding electrodes, their applications, recommended currents and expected properties are covered. **Circle No. 51 on Reader Service Card.**


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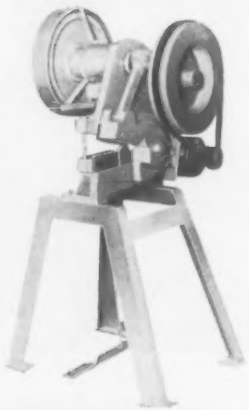

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**NEW ENGINE DRIVEN WELDERS SAVE** by boosting welding speed is claim for new line in illustrated brochure by General Electric Company. Features such as a geared governor, pusher-type engine fan and controlled current peaks are described in detail. **Circle No. 88 on Reader Service Card.**

**IMPROVED LINE OF SUBMERGED ARC WELDING HEADS** is announced by the Linde Air Products Co. in their illustrated brochure. Specifications, operating data and advantages are given for the UEH-1, UEH-2 and USH-2 models comprising the new line. **Circle No. 233 on Reader Service Card.**

**AUTOMATIC WELDING POSITIONERS, TURNING ROLLS AND HEAD MANIPULATORS** are featured in illustrated literature available from Unique Equipment Co. Specifications for models which will handle a wide range of work are included. **Circle No. 166 on Service Card.**

**NEW PASTE-TYPE BRAZING FLUX** for high temperature, high strength brazing of stainless and high alloy steels is introduced in literature available from Wall Colmonoy Corp. Cleaning and wetting action, physical properties and methods of application of Nicrobraz flux are covered. **Circle No. 234 on Reader Service Card.**

**WANT TO MAKE TOUGH SERVICE WELDS?** A. O. Smith Corporation explains how in their detailed catalog covering a complete line of welding electrodes. Electrode types, applications and properties are given. **Circle No. 141 on Reader Service Card.**

**"THE FINEST IN STEEL LIFTING CLAMPS"** is how J. C. Renfroe & Sons, Inc. describes its products in a colorful, 11-page catalog and price sheet. Safety lock clamps that meet a variety of lifting demands are described in detail. **Circle No. 135 on Reader Service Card.**

**HOW STANDARD POSITIONING UNITS LOWER WELDING COSTS** is the title of a magazine article reprint offered by C. B. Herrick Mfg. Corp. Complete line of standard—and special—fixtures for automatic welding operations are described and illustrated. Typical set-ups are explained. **Circle No. 237 on Reader Service Card.**


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*For Your Shop Notebook*

# Hard Surfacing Comparison Chart

THIS chart has been compiled to help welding users select correct hard surfacing alloys for their specific applications. Electrodes and rods are listed according to the application to which they are considered best suited. Most have more than one use.

All manufacturers are listed according to comparative data recently compiled and made available by Rankin Manufacturing Co.

*Tear out and save—Write us for additional copies if you need them.*

| APPLICATION ➡ / MANUFACTURER ⬇ | BUILD UP | ABRASION AND SHATTERING IMPACT | ABRASION AND SEVERE IMPACT | SEVERE ABRASION AND MEDIUM IMPACT | EXTREME HARDNESS --- MEDIUM HARD IMPACT | MOST SEVERE ABRASION LOW IMPACT --- SOME CHECKING PERMITTED | EXTREME ABRASION MEDIUM CORROSION --- SOME TEMPERATURE HARDNESS ELECTRIC | EXTREME ABRASION --- ELECTRIC ACETYLENE | EXTREME ABRASION --- TUNGSTEN TUBE |
|---|---|---|---|---|---|---|---|---|---|
| Airco | R-mang, Air Mang | 46 | 300 660 | Aircolite 89 | | | Coated Aircolite | Bare Aircolite | Tungtube |
| Alloy Rods | Wear-Arc WH | Wear-Arc 3 or FP | Wear-Arc 6 | | Wear-Arc or Chrome Boride | Wear-Arc 40 or Chrome Boride | Wear-Arc 40 or Chrome Boride | Wear Flame 40 | |
| Amsco | Nickel Manganese | Air Hardening | HF 60 or Economy | HF 40 | | 459 or Ni-Hard | Coated 459 | Bare 459 | Tungalite |
| Bergstrom | Mangalloy, Type S | Trekaloy | Fissaloy or C | A | Supraloy | | | | |
| Coast Metals | | | 100 | 112 | | | 101 104 | 1, 4 | Tungsten |
| Colmonoy | | | 1, 2 | | | | 4, 5, 6 | Wallex or Bare 4, 5, 6 | |
| Haynes | | | 90, Haschrome | | 93 | | Coated 93 | Bare 92 or 93 | Haystellite |
| Lincoln | Manganweld | Hardweld 100 | Abrasoweld Wearweld 200 90 | Facewald 1 or 12 | | Facewald 1 or 12 | | | Tungweld |
| Marquette | | | 400 | 500 | 650 | | | | |
| Metal & Thermit | Nickel Manganese | Hardex 25 | Hardex 45 or 60 | | | | | | |
| Mirocol | Nic-L-Mang | 4 | 3, 13 | | | 1, 2 | 1, 2 | 1, 2 | Tungmetal |
| N.C.G. | Surewald 9 or 95 | 7N | Surewald H or H2 | Surewald H1 | | | | | |
| Osago | | A | B | C | | | Osagite | Osagite | Tube Metal |
| P & H | Harnimang A or B | Harcote III, Hartop Brown | Hartop Green or Red | Hartop Yellow | | | | | |
| Rankin | Ranite "A" | Ranite "A" | Ranite "B" or "B-X" | Ranite "C" | Ranite "D" | Ranite "F" | Ranite "No. 4" | Ranite "No. 4" Washcoat | Rantung |
| Resistoloy | Two-Tone | Two-Tone | Flintype Isorod | | | | Coated Resistoloy | Bare Resistoloy | |
| Sight Feed | S-3 | Rosarc 30 | Rosarc 45 or 55 | Rosarc 66 | | | CB | CB | Tube Tungsten |
| Stoody | Build-up or Manganese | | Self Hardening 1027 or 21 | 1293 | | | Coated Stoodite | Bare Stoodite | Tube Borium |
| Stulz-Sickle | Manganal | | Sasco | | | | | | |
| Victor | | A | B or Victoralloy | C | | | Victorite | Victorite | Victortube |

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# NEWS

from page 22

## Canadian Manager for Progressive Welder

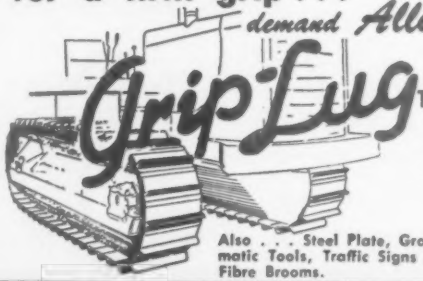
Appointment of E. J. Formhals as General Manager of Canadian operations, has been announced by the Board of Directors of Progressive Welder, Canada Limited.

Mr. Formhals has an extensive background in management, engineering, manufacturing and sales, both in Canada and the United States.

## Berlin Joins Unique

Arthur Berlin, formerly product engineer of the Positioning Equipment Division of Worthington Corp. has joined Unique Equipment, Inc., Brooklyn, New York, as Senior Sales Engineer according to an announcement made by Albert W. Nuccel, president of Unique.


for a firm grip . . . demand *Allied* BULLDOG



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## Three New Sections Formed by A.W.S.

Three new sections have been formed by the American Welding Society to bring the total of active sections throughout the nation to 81.

One of the newly activated sections covers the area in and around Utica, New York and will be known as the Mohawk Valley Section. D. A. St. Louis of A. H. St. Louis Co., is Chairman.

Another of the new sections has been organized in San Antonio, Texas. Known as the San Antonio Section, it formerly functioned as a division of the Houston Section. R. D. Sprague, Campbell Steel Co. is Chairman.

The third new section will service the region in and around Canton, Ohio, and will be known as the Stark Central Section. E. W. Rowlands, Griscom-Russell Co., is Chairman.

For Valuable Reference Material Available At No Charge See Page 28.

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WHEN YOU WELD CAST IRON SELECT THE CORRECT

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CAST IRON WELDING RODS OR ELECTRODES

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FUSE-WELL No. 11, *Square*—Gray Cast Iron Welding Rod for Acetylene use in filling or building up new or worn castings producing machineable welds.

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FUSE-WELL No. 14, *Moly*—An Iron Base Rod with alloys added for finer grain structure and greater strength.

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## W. B. Bunn Moves to Combustion Engineering

One of the best known and best qualified experts on welded fabrication and shop management, W. B. Bunn has joined the Metallurgical Division of Combustion Engineering, Inc., Chattanooga, Tenn. Mr. Bunn was formerly manufacturing engineer in charge of all welded fabrication at M. W. Kellogg Co., Jersey City.

## Special Library Group Meets in Cleveland

The Metals Division in cooperation with the Cleveland Chapter of Special Libraries Association will have a booth at the National Metal Congress and Exposition in Cleveland, October 8-12. The booth will represent a metals library with technical literature specialists on hand to answer questions on library services. Current books and periodicals will be on display.

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## Make P&H Electrodes in Santiago, Chile

A complete line of welding electrodes are now manufactured in Santiago, Chile, by a new company being formed with joint ownership by A. Montero y Cia. S. A. and Harnischfeger International Corp. The new firm has been licensed by Harnischfeger Export Corp.

A completely new factory was erected for the manufacturer of the P&H electrode line and latest manufacturing equipment installed under supervision of Tom Walker, P&H service engineer.

Distribution of the Chilean produced electrodes will be made through P&H distributors in other Latin American countries.

## Joins Curtiss-Wright

Karl M. Weigert is in charge of brazing research on new methods and materials at the Quehanna, Pa., research laboratories of Curtiss-Wright Corp. Dr. Weigert was formerly associated with Goldsmith Bros. Smelting and Refining Co., Chicago.


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**A great time-saver . . powerful, long-lasting built-in Alnico magnets produce a vise-like grip that holds the ground hog to work in any position . . . on flat, round or angular surfaces.**

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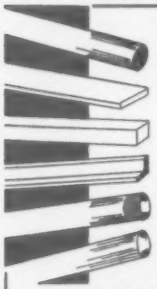
## Bethlehem Welds Refinery Parts

**Bethlehem Steel's big weldment shop at Bethlehem, Pa., is almost filled with sections of steel tanks being fabricated for the new $130-million Delaware Flying-A Refinery being constructed for Tide Water Associated Oil Co., 15 miles south of Wilmington.**

**Plant will include three of the largest oil processing units ever built: a crude unit with capacity of 130,000 bbls. of crude oil daily, a 42,000 bbls. per day fluid coker and an Orthoflow fluid catalytic cracking unit with total charge capacity of 102,000 bbls. per day.**


**For Valuable Reference Material Available At No Charge**
**See Page 28**





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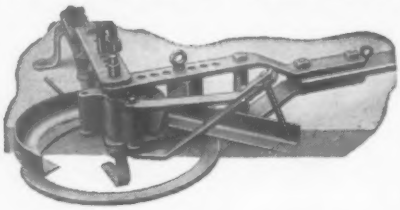

Wrenchless, the Hossfeld Bender is always ready for use. It's easily and quickly set up for the 101 different bends needed every day in maintenance and production work. Adaptable, it replaces special bending equipment. For those hard-to-pull bends on heavier material, a Hydraulic Attachment (optional) enables one man to do the job.


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## Crucible Appoints Two

Crucible Steel Co. of America has announced appointment of Walter Slinger and Benjamin F. Doty as welding engineers with headquarters at Crucible's New York Branch, Harrison, N.J. Both will report to J. A. Goodford, chief welding engineer.

Mr. Slinger has been associated with Crucible for over 25 years as

SLINGER

DOTY

a welding supervisor at the Spaulding Works, Harrison, N.J.

Mr. Doty comes to Crucible with more than 20 years experience in the welding field. During that time he has been a vocational instructor and served as superintendent in charge of stainless steel fabrication.

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### Without Automatic Equipment

It's the new Marquette No. 285 Hard-Rod . . . A.C. or D.C. straight or reverse polarity. A powdered iron coated contact-type electrode for high speed hardsurfacing to resist extreme impact and moderate abrasion. Work hardening austenitic chrome alloy forms wear resistant chrome carbide in the deposit.

The tough overlay has a deposited hardness of 285-320 Brinell, work hardens to 485-550 Brinell. Heat treatment not necessary. Conductive "ferromolostic" coating increases arc stability, takes higher amperages, deposits weld up to 2½ times faster than ordinary hardsurfacing rods.

Proved on the rugged Mesabi Range, overlays of No. 285 kept iron ore washing screens operating longer than any other alloy tested. See your nearest Marquette Distributor or write us for full information.

MARQUETTE

**Marquette Manufacturing Co., Inc.**

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## Develop Steel Color Identification System

Color marking has long been used as a means of identifying steel bar stock. Both carbon and alloy steel bars have distinguishing colors painted on cut ends to prevent mixing them.

A new color identification system recently developed by Joseph T. Ryerson & Son, Inc., features meaningful use of color.

For example, single colors are reserved for standard carbon and carbon manganese steels. Carbon colors — green, blue, yellow and pink — always define carbon content. Centered dots of these colors indicate heat treated condition. Alloy steels, in the main, are desig-

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nated with two colors: one indicates particular analysis group, the other the carbon content.

A pocket size card which explains the new system may be secured from the company at Box 8000-A, Chicago 80, Illinois, or by circling No. 201 on the Reader Service Card in this issue.

## $2 Million Expansion Program for Tube Turns

Tube Turns, Louisville, Ky., has bought thirteen acres of industrial property for expansion purposes. The price was $2 million. The property is adjacent to Tube Turns' main plant at Twenty-eighth and Broadway. Tube Turns is a division of National Cylinder Gas Company, Chicago, headed by Charles J. Haines.

Tube Turns is the world's oldest and largest manufacturer of welding fittings and flanges for industrial piping systems, and a major producer of custom forgings for jet and conventional aircraft engines.


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Low Hydrogen, Low Hydrogen Powdered Iron, Stainless Steel Electrodes, and Inert Arc Coiled Welding Wire are all feverishly thirsty, and adsorb atmospheric moisture immediately upon exposure. Weld metal porosity and other defects are an immediate and positive result. You can give these expensive electrodes the finest protection with Archer Aridair Stabilizers, especially engineered to stabilize the moisture content at the proper point. New 550# capacity Model 724SEA, equipped with twin chemical dehydrators and thermostatic control from 150° to 550° available immediately. Spare parts for discontinued Model 400 available.

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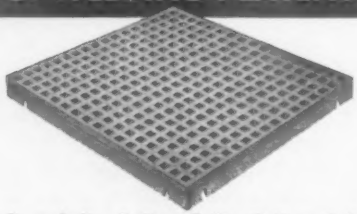
or WELDING PLATENS



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## Mayor Joins Thornton

William "Bill" Mayor has joined the Thornton Company, Cleveland Ohio, as an estimator and assistant to Frank Flocke, vice president in charge of engineering and sales. Mr. Mayor has been associated with the welding industry since 1935. For the past 10 years he has been in the Estimating Department of Lewis Welding & Engineering Corp., Bedford, Ohio. He served as Supervisor of Estimating and Processing Department for the last four years.

Active in the American Welding Society, Mayor is currently First Vice Chairman of the Cleveland Section.

## Wall Colmonoy Consolidates

Completion of new, modern foundry facilities for manufacture of hardfacing alloys has been announced by Mr. W. P. Clark, vice president of Wall Colmonoy Corp., Detroit, Mich.

The new foundry contains a complete line of moulding equipment, electric melting furnaces and production machinery for manufacturing and packaging alloy welding rods, electrodes and powder.

## Wagner Manufacturing Now Lenco, Inc.

In order to avoid firm name confusion, Paul J. Leonard, president of Wagner Mfg. Co., Inc., Jackson, Missouri, announced that the Board of Directors has authorized changing the company name to Lenco, Inc., effective September 1st.

Their trade name, Hi-Amp, has been granted registration rights and hereafter will identify all arc welding accessories manufactured by the company.

There has been no change in management personnel.

## Eutectic Appoints Field Customer Service Managers

Appointment of three field Customer Service Managers has been announced by Rene D. Wasserman, president, Eutectic Welding Alloys Corp. They are Herman J. Greif, Robert H. Groman and L. D. Richardson who cover the Central States, Midwest States and Eastern States, respectively.


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Fluxes for Welding Brazing Silver and Soft Soldering

KOP-R-ARC Coated Rods

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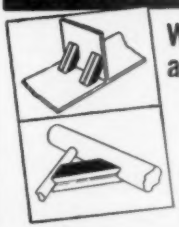
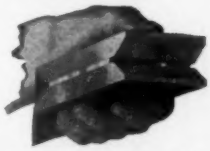


Welding Aids with a Thousand uses!



Aronson MACHINE CO.
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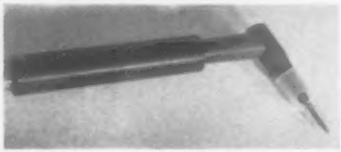
**TIG WELDING**
Made Easy With
**"Visuweld" Torches**



VISUWELD torches improve and simplify tig welding by giving faster and better welds with less effort and minimum torch maintenance.

- The lightest and smallest 300 amp TIG welding torch with super maneuverability.
- Only TIG torch made with standard size transparent nozzle that guarantees absolute welding visibility.
- No SPARE PARTS NECESSARY. No gaskets or parts to 'screw together'.
- VISUWELD contained unit torch head guarantees no water or gas leakeage, and the coolest TIG welding torch ever designed.

Perfect welds at welding ranges from 3 to 350 Amps eliminates the need for 'standby' torches. VISUWELD torches are 3 torches in 1.

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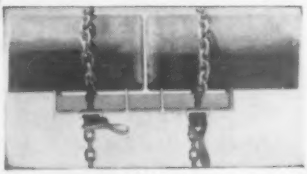
**JEWEL PIPE CLAMPS**



**For fast, Accurate Pipe Welding. Sturdy construction for hard usage. Aligns and holds pipe for tacking. Two sizes: ½" to 8" and 8 to 16". Write for details**

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## Saginaw Welding Supply Incorporates

Formed on April 1, 1942, as a partnership by James N. Alcock and his wife, Rose., Saginaw Welding Supply Co., Saginaw, Michigan, has become a corporation with a capitalization of $100,000. Officers are Mr. Alcock, president; Mrs. Alcock, secretary-treasurer, and Robert P. Gehring, vice president.

GEHRING

Mr. Gehring, who has a wide background in welding sales and engineering, was brought into the firm to expand its automatic welding operations. Except for four years in the Navy, Mr. Gehring was with Westinghouse Electric Corp. from 1940 to 1951. He was in charge of automatic welding applications and negotiations from 1946 to 1951 and was welding sales engineering until 1954, when he joined Cayuga Machine & Fabricating Co. as sales manager.

## United Specialty Corp. Plan Expansion

The board of directors of the United Specialty Corporation, manufacturers of industrial hose reels and welding cable reels, are planning to add additional production facilities and equipment to their present holdings. The sales and service departments are also expected to add personnel to their staff.

**For Valuable Reference Material Available At No Charge**
**See Page 28**

## Jackson Appoints Southwestern Rep

Howard N. Simms has taken over as field representative for Jackson Products, Inc., in the firm's Southwestern territory. Mr. Simms, who was formerly with Black, Sivalls & Bryson, Inc., Oklahoma City, Okla., will headquarter in that city.

## Klasson Joins O.K.I.

Appointment of George A. Klasson as manager of the Electric Welding Division of O.K.I. Welding Supply Co., Cincinnati, Ohio, has been announced by E. C. Caluwaert, company head.

Mr. Klasson was formerly Regional Manager for electric welding sales for Westinghouse Electric Corp. in southern Ohio.


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**NO-SPAT** ***WELDING FLUID***

Fixtures, weldments and surrounding surfaces are kept free of spatter. Costly chipping and grinding is eliminated. NO-SPAT is non toxic, and also suppresses fumes, generated by welding! NO-SPAT prevents rust and it conditions metal surfaces for painting! Some users coat entire metal equipment with NO-SPAT for maximum ease of welding, rust prevention, and paint conditioning. Shipped ready to use.

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**STRONGER WELDS**

No. 1 Cast Iron Welding Flux
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No. 11 Tinning Compound
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FORT WAYNE, INDIANA

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## BUSINESS OPPORTUNITIES

**MECHANICAL ENGINEER WELDING AND CUTTING TORCHES**

**Our K-G Welding Equipment Division offers an unusual opportunity to an experienced design and development engineer on gas welding and cutting apparatus. If you are stymied and are ready to take a position of senior responsibility with an alert growing organization, send your qualifications in confidence to:**

**B. H. Van Dyke, Air Products, Inc., P.O. Box 538, Allentown, Pennsylvania.**

**POSITION WANTED**

**Experienced, capable, sales promotion-minded man, with a proven record of successful sales to important welding users and distributors. Mature, with a pleasant sales personality and valuable knowledge of sales and distribution problems. Specialized "know-how" including silver alloys and fluxes and all other types of brazing materials and applications.**

**Willing to travel; now living in Ohio, but will relocate if necessary.**

**Write to Box 10156, INDUSTRY & WELDING Magazine, 812 Huron Road, Cleveland 15, Ohio.**

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The Duro Electrode Holder has served the welding industry since 1932.

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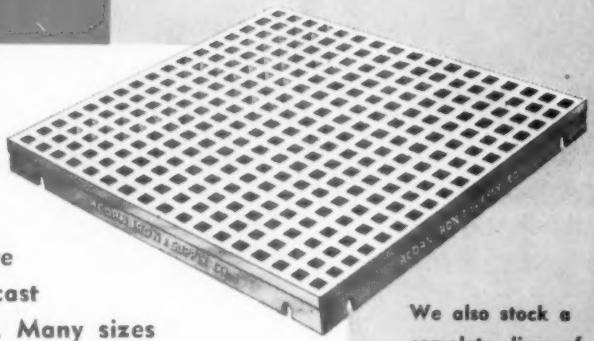

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